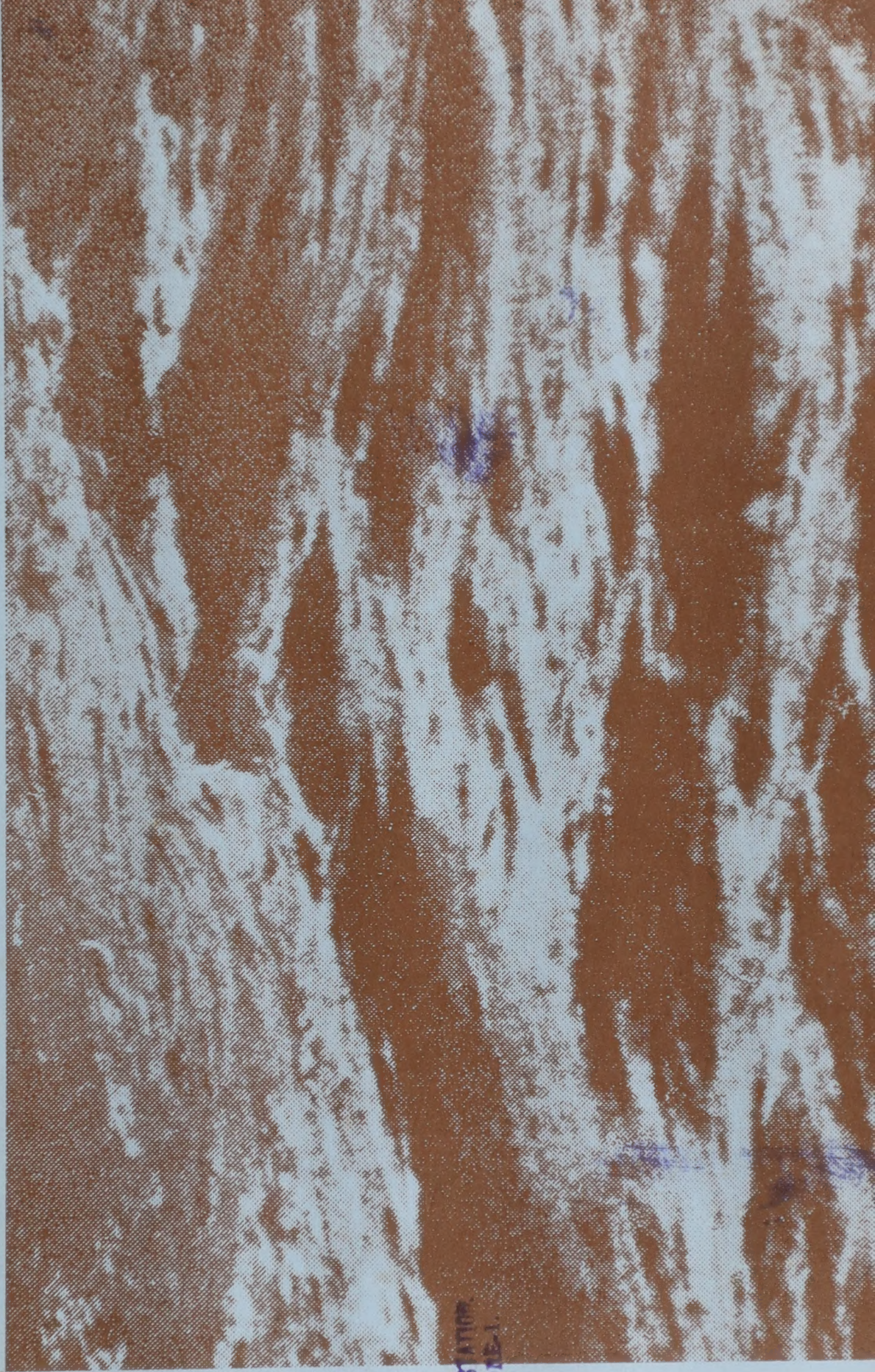




# Commercial Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service



C.F.T.R.I.  
FISH TECHNOLOGY EXPERIMENT STATION  
P.O. Box 100, Mangalore-1.

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# UNITED STATES DEPARTMENT OF COMMERCE

Maurice H. Stans, Secretary

## NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

### NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, Director

#### FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

*Commercial Fisheries Abstracts* contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

**C. F. T. R. I.**

**FISH TECHNOLOGY EXPERIMENT STATION.**

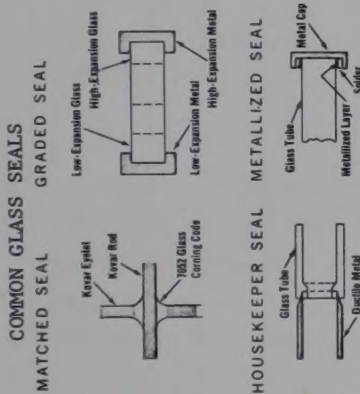
**Hoige Bazaar, MANGALORE-1.**



Hogan, Raymond E. (Electronic Materials Department, Corning Glass Works, Corning, New York)  
Chemical Technology (Chem Tech) 1, No. 1, 41-43 (January 1971) (American Chemical Society Publications Division, 1155 Sixteenth St., N.W., Washington, D.C. 20036)

Solder glasses melt at low temperature and are useful for sealing glass to glass, to metal, or to ceramic material. In this paper, the author defines the types of solder glasses, describes their uses, discusses sealing considerations, and mentions several different sealing techniques. Differential expansion tables are included that show at a glance the materials that make matching seals.

Apparently, sealing with solder glass is economical. Furthermore, if furnace controls are used and temperatures are minimized, consistently reliable, mass-produced seals are available for many applications. The following figure shows four commonly used glass seals. [4 figures, 2 tables, 8 references]



FTP

- 0.119 UN DISPOSITIF SIMPLE PERMETTANT D'ÉTUDER LE COMPORTEMENT  
(1.81)(9.12) DES HUITRES SOUS DES CONDITIONS EXPÉRIMENTALES  
OU DES CONDITIONS NATURELLES DE MILIEU  
[A SIMPLE APPARATUS FOR STUDYING THE BEHAVIOR OF OYSTERS  
UNDER EXPERIMENTAL OR ENVIRONMENTAL CONDITIONS]

His, Edouard  
Science et Pêche No. 196, 1-6 (October 1970) (In French)

Nutrition, respiration, and excretion of the oyster depend on the ciliary activity of the branchial epithelium and the action of the adductor muscle as a consequence of the opening and closing of the valves. According to Galtsoff, the lack of ability to flee makes contraction and relaxation of the muscle the only significant reactions the mollusk has for responding to either external or internal stimuli. Valve movements, then, are a faithful indication of the oyster's reactions to environmental conditions. A record of these movements should demonstrate the influence of temperature, turbidity, tidal cycles, and pollution on the physiological behavior and functions of the oyster.

This report describes the simple, easily operated device used by the author to monitor the valvular movements of the European oyster (*Ostrea edulis*) and the Portuguese oyster (*Crassostrea angulata*). Briefly, it consists of a rotating drum of paper mounted on a platform above the subject. First the oyster is glued to a fixed support, such as a brick. Then a nylon thread is attached to the upper shell opposite the hinge. This thread leads to a horizontal writing arm that supports a pen. The tension on the thread is precisely adjusted to record any movement of the valve without disturbing the oyster's behavior. Displacement of the pen is governed by the position of the thread relative to the axis of the arm. A plastic

Redfern, R. (Cherry-Burrell Corp., Chicago, Illinois)  
Food Engineering 43, No. 1, 60-63 (January 1971)

This article describes a machine designed to serve as the center of a food-processing system. It consists of a stationary cylindrical bowl above a motor housing. It is driven through a central column by two dual-speed motors, one of which operates a mixing blade at either of two speeds and in either a clockwise or a counterclockwise direction; the other drives the planetary system, including a scraper assembly, in a clockwise direction. With the resulting eight mixing actions, ranging from fast high-shear to slow low-shear blending, a variety of materials can be amalgamated with a minimum degree of attrition. The whole operating area, with the exception of the central column (about 10% of the working surface), can be heated or cooled; if required, different temperatures can be maintained in separate parts of the machine. A special cover permits either pressure or vacuum processing.

This machine can be used for three types of processing--batch processing; continuous-batch, cyclic processing (in conjunction with other units of these machines); or continuous in-line processing (with available swivel-jointed, stainless steel, supply lines connected to inlet and outlet ports). In each type, the right weight of raw material (to an accuracy of 1 part in 1,000) is introduced in the right sequence and at the right time. It is then processed as required--defrosted, comminuted, mixed, homogenized, cooked, cooled, and/or evaporated--until the finished product is ready for discharge into packages or containers; no transfer to

- 0.32 STUDIES ON MYOFIBRILS FROM THE STORED MUSCLE.  
(0.35) PART I. POST-MORTEM CHANGES IN ADENOSINE TRIPHOSPHATASE ACTIVITY OF MYOFIBRILS FROM RABBIT MUSCLE

Yang, Ryung, Akihiro Okitani, and Masao Fujimaki (Department of Agricultural Chemistry, University of Tokyo, Tokyo, Japan)  
Agricultural and Biological Chemistry 34, No. 12, 1765-1772 (December 1970)

The actual physicochemical changes that take place in muscle post mortem and that lead to tenderization are not yet known. Much of the available evidence seems to indicate that proteolysis is not the primary cause of postmortem tenderization of muscle. Most studies on the aging (the period during which tenderization takes place) of muscle have involved the molecular properties of the myofibrillar proteins. The present study was carried out to obtain further information on the biochemical changes in the actomyosin at the subcellular level during the storage of muscle by using the myofibril from prerigor, rigor, and postrigor muscle.

The longissimus dorsi muscle of the rabbit was used. The adenosine triphosphatase (ATPase) activity of the myofibrils isolated from the fresh muscle and the muscle stored at 4° C. was measured. The chopped muscle was homogenized for 1 to 3 min. in a blender in one of four extracting solutions.

The greater the mechanical breakdown (longer period of homogenization) of the muscle, the greater the Mg-activated ATPase activity of myofibrils. The Mg-activated ATPase activity of the myofibrils increased as the muscle aged (stored at 4° C.)

When the myofibrils from prerigor and rigor muscle in 0.16 M KCl were treated with 0.6 M KCl-18 mM Tris-maleate solution (pH 7.0), the Mg-activated ATPase



Kremling, K. (Institute for Marine Research, Kiel, West Germany)  
Nature 229, No. 5280, 109-110 (January 8, 1971)

Sea-water density is usually calculated from tables of the relation between salinity, temperature, and density. In the salinity range 5‰ - 15.40, the tables give good results, but for water of low salinity, the variation of ionic relationships can cause discrepancies. A new system has been devised that determines density electronically. The results are accurate and the method is rapid. The apparatus consists of a hollow, glass, bending oscillator, 2 mm. in diameter, that is excited into undamped oscillation. When the oscillatory system is filled with a sample of sea water, the resonant frequency of the oscillator is influenced by the mass--and therefore the density--of the sample.

LB

Among the applications mentioned by the author are vacuum cooking and cooling of meat, fish, vegetables, and fruit; continuous pasteurization of food products; and manual manufacture of food products; and particularly new methods of heating and cooling treatments.

0.32 CIRCULAR DICHROISM AND ELECTRON PARAMAGNETIC RESONANCE OF THE HAPTOGLOBIN-HEMOGLOBIN COMPLEX

Mäkinen, Marjatta W., and Hideo Kono\* (Laboratory of Physical Biology, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Maryland 20014) (\*To whom to address correspondence)  
Biochemistry 10, No. 1, 43-52 (January 5, 1971)

Haptoglobin (an  $\alpha_2$ -globulin isolated from serum) binds hemoglobin, forming a complex of 1:1 stoichiometry and marked alteration of heme function with increased peroxidatic activity. The authors investigated this complex using a variety of spectroscopic methods to assess the influence of alterations in hemoglobin structure in changing the reactivity of the prosthetic group.

[8 figures, 1 table, 61 references]

FTP  
The authors state that the results show that, as long as ATPase activity and the dependence of ATPase activity on KCl concentration are concerned, the myofibril isolated from muscle stored at 4° C. for 8 days is the most similar to the isolated actomyosin (although actomyosin may exist in a different form from that in solution). They suggest that the myofibril underwent structural alteration as a result of storage. The ATPase activity of the myofibril showed greater dependence upon the KCl concentration as the muscle aged.

(55.0) 23.0

LLP

From the guinea pig, a method is described for the recovery of proteins from cheese whey to which applications in the food industry are suggested. The whey is treated with a series of solvents to remove lipids, proteins, and carbohydrates. The remaining material is then treated with a series of solvents to remove the remaining components. The final product is a highly purified protein fraction.

Membrane ultrafiltration (MUF) can separate low-molecular-weight materials from liquids containing high-molecular-weight materials. This article, the first of five, describes the process and compares it with competitive methods from an operational and economic viewpoint.

1.81 A REVIEW OF POSSIBLE CAUSES OF MORTALITY OF OYSTER LARVAE OF THE GENUS CRASSOSTREA IN TOMALES BAY, CALIFORNIA

Berg, Carl J., Jr. (Pacific Marine Station, Dillon Beach, California)  
California Fish and Game 52, No. 1, 69-75 (January 1971)

Oysters of the genus *Crassostrea* do not produce successive generations in Tomales Bay, California, because of the failure of the larvae to survive and set. Excessive turbidities, lack of proper food, and blooms of dinoflagellates are probably the major causes of oyster larvae mortality, although there are other contributing factors. [35 references]

Author's abstract

The author has used the myograph to measure the limits of tolerance of oysters to different environmental factors. He has shown that this organism is able to tolerate a wide range of environmental conditions. The myograph is a device which records the movement of a clock's hands. The height of the paper permits continuous monitoring of the record. A removable cover protects the device when it is used out of doors. A thermometer placed alongside the subject measures the temperature of the water continuously; salinity and dissolved oxygen are determined at regular intervals.

The drum holding the paper is rotated by the movement of a clock's hands. The height of the paper permits continuous monitoring of the record. A removable cover protects the device when it is used out of doors. A thermometer placed alongside the subject measures the temperature of the water continuously; salinity and dissolved oxygen are determined at regular intervals.

(16.1) 61.0



# DETERMINATION OF CARNOSINE, ANSERINE, AND BALENINE IN THE MUSCLE OF ANIMAL

Suyama, Michizo, Takeshi Suzuki, Michie Maruyama, and Kaoru Saito (Tokyo University of Fisheries, Konan, Minato-ku, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries **36**, No. 10, 1048-1053 (October 1970)

Carnosine ( $\beta$ -alanine-histidine), along with its methylated derivatives anserine ( $\beta$ -alanine-1-methylhistidine) and balenine ( $\beta$ -alanine-3-methylhistidine), are known to occur in animal tissues. Nuclear magnetic resonance has proved that balenine and opidine (erroneously reported as  $\beta$ -alanine-2-methylhistidine) are identical. Although many data have been published on the isolation and assay of these compounds in animal tissues, knowledge about their distribution and assay of these compounds deficiency, the authors examined the distribution of the compounds in the flesh of fishes, shellfish, snakes, a snail, an echinoderm, and a chicken.

The authors used the chromatographic technique of Spackman et al. (1958) throughout--that is, a  $0.9 \times 50$  cm. column of Amberlite IR-120. However, to improve the resolution of the compounds, they changed the pH value of the sodium citrate buffer (0.38 N) to 4.06 and elevated the temperature of the column to  $50^\circ\text{C}$ . They found no carnosine, anserine, or balenine in Pacific saury (*Cololabis saira*), Pacific mackerel (*Scomber japonicus*), flatfish (*Kareius bicoloratus*), takabe *Labracollossa argenteiventris*, shrimp (*Metapenaeus joyneri* and *Penaeus orientalis*), clams (*Meretrix lusoria* and *Schizothaerus keenae*), snail (*Turbo [Batillus] cornutus*), abalone (*Haliotis gigantea*), squid (*Todarodes pacificus* and *Doryteuthis bleekeri*), octopus (*Octopus ocellatus*), dogfish (*Mustelus manazo*), or sea cucumber (*Stichopus japonicus*). They did find one or more of these peptides in 22 of the fish species, as shown on back of card.

(over)

## PRELIMINARY STUDIES ON MUSCLE PROTEIN POLYMORPHISM OCCURRING WITHIN THE GENUS *TILAPIA*

(1.92)

Hines, R., and A. Yashouy (Fish Culture Research Station, Dor, Israel)  
Bamidgeh **22**, No. 3, 69-71 (September 1970)

Among some of the several related species of tilapia cultured in Israel, morphometric values, color, and habitat vary only slightly. Being able to distinguish the species by biochemical as well as morphological methods is desirable for both practical and taxonomic reasons. Therefore, the authors analyzed the electropherograms given by the muscle tissue extracts from six male fish of each of the following species: *Tilapia aurea* (from three geographic locations), *T. volcani*, *T. zillii*, *T. mossambica*, and *T. galilaea*.

The starch-gel electrophoretic patterns of *T. aurea* and *T. volcani* varied so slightly that additional study will be required to determine if the difference in their muscle myogens is significant enough to allow species differentiation. Although the morphological characteristics of *T. aurea* from the three geographical areas differed, their muscle protein patterns did not vary significantly. In contrast, the patterns of *T. zillii*, *T. mossambica*, and *T. galilaea* were quite distinct, permitting ready identification of each species.

[1 figure, 5 references]

LB

Chemical Abstracts **73**, No. 25, 127975j (December 21, 1970)

Jeffries, H. Perry (Grad. Sch. of Oceanogr., Univ. of Rhode Island, Kingston, R.I.)  
(0.39) FATTY ACIDS  
SEASONAL COMPOSITION OF TEMPERATE PLANKTON COMMUNITIES:

0.322  
(7.52)

# CHANGES IN FREE AMINO ACIDS DURING ASEPTIC AUTOLYSIS OF THE MUSCLE OF MACKEREL

Manita, Hideaki, Chiaki Koizumi, and Junsaku Nonaka (Tokyo University of Fisheries, Konan-4, Minato-ku, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries **36**, No. 9, 963-971 (September 1970)

Several researchers have studied the qualitative changes that occur in the free amino acids of fish muscle during the course of autolysis or during low temperature preservation. In 1962, Hoshino reported the quantitative changes he had determined by means of bioassay. However, the authors say, his results are questionable, since his aseptic treatment was faulty. In this paper, they report the quantitative changes they determined by gas-liquid chromatography.

First the amounts of free amino acids in the muscle of mackerel were determined by replicate GLC analyses. The results were quite similar; results obtained with an amino-acid autoanalyzer were, on the whole, slightly higher. Then the muscle of fresh mackerel was homogenized, and the homogenate was incubated at pH 3.5 and  $45^\circ\text{C}$ . After 0, 12, 24, and 48 hr., portions of the homogenate were analyzed. A table gives the changes that were evident in each amino acid after each incubation period. Hydroxyproline, which was not present at 0 hr., appeared in small amounts during autolysis.

(over)

## LACTATE AND MALATE DEHYDROGENASE ISOZYME PATTERNS IN FISH AND MARINE ANIMALS

Numachi, Ken-ichi (Ocean Research Institute, University of Tokyo, Nakano, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries **36**, No. 10, 1067-1077 (October 1970)

Lactate dehydrogenase (LDH) of fish has been studied by several workers. In 1965, Markert et al. reported that not only does fish LDH have isozymic forms but the electrophoretic patterns of the isozymes vary markedly between species. They suggested that, as in mammals and birds, the LDH isozymes of fish could be attributable to polymerization of two protein subunits under the control of two genes. In the following year, studies by Morrison et al. on the LDH of Salmonidae provided confirmatory evidence on the subunit structure and genetic control of LDH isozymes. Because knowledge about the molecular heterogeneity and genetic control of enzymes is useful for (1) studying evolutionary and taxonomical problems of fish, (2) analyzing fish populations (by using isozymes as well as blood groups in the determination of genotype from phenotype), and (3) clarifying the subtle regulation of metabolism and ecological behavior in fish species, the authors began a series of studies on the molecular heterogeneity in and the biological significance of fish enzymes. In this first study of the series, they show the marked species variation in the electrophoretic patterns of LDH and of malate dehydrogenase (MDH) in fish species. This variation is in striking contrast to the similarity they found in the isozyme patterns of marine mammals.

(over)



0.33 (8.8) THE CURRENT STUDIES ON THE FRESHNESS OF FISH WITH SPECIAL REFERENCE TO NUCLEIC ACIDS AND THEIR RELATED COMPOUNDS

Uchiyama, Mitoshi, and Shigeo Ehira (Tokai Regional Fishery Research Laboratory, Kachidoki, Chuo-ku, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 9, 977-992 (September 1970) (In Japanese)

This review article contains 6 figures and has 183 references.

0.39 (9.13) TOTAL  $\beta$ -ACTIVITY OF OCEAN FISH  
Todorov, Ivan, and Dobrin Bozhkov (Dist. Vet. Sta., Burgas, Bulgaria)  
Chemical Abstracts 73, No. 25, 127461p (December 21, 1970)

0.38 PROTOLYTIC ENZYMES IN SEA URCHIN EGGS: CHARACTERIZATION, LOCALIZATION, AND ACTIVITY BEFORE AND AFTER FERTILIZATION  
Krischer, Kenneth N., and Edward L. Chambers (Dep. of Biochem., Univ. of Miami, Miami, Florida)  
Chemical Abstracts 73, No. 21, 105700p (November 23, 1970)

0.320

Fish species	Number of specimens	Amount (range) of peptide found (mg.%)	LB
Whales: <i>Balaenoptera physalus</i>	4	Carnosine 103-140 Anserine 2.8-5.0 Balanine 1340-1520	
<i>Balaenoptera borealis</i>	4	6.4-18.2 1560-1930	
<i>Balaenoptera acutorostrata</i>	3	22.7-49.3 1700-1990	
<i>Physeter catodon</i>	4	83.6-137 0.8-3.2	
<i>Globicephala melaena</i>	2	37.5-39.0 515-590	
Dolphin, <i>Delphinus delphis</i>	2	227-275 489-766	
Harbor seal, <i>Phoca vitulina</i>	2	384-447 118-150	
Elasmobranchs: <i>Glyphis glaucus</i>	2	511-592 22.6-34.3	
<i>Carcharhinus longimanus</i>	3	0 2.3-3.6	
<i>Isurus glaucus</i>	1	284 29.9	
<i>Squalus mitsukurii</i>	1	2.9 0.3	
<i>Dasyatis akalei</i>	1	1010 0	
Tunas: <i>Tunnus obesus</i>	1	2.3 0	
<i>Tunnus albacares</i>	2	859-1590 0-10.9	
<i>Tunnus alalunga</i>	1	1090 6.5	
<i>Tunnus maccoyii</i>	3	398-1570 0	
Sardine, <i>Sardinops melanosticta</i>	1	735 0	
Horse mackerel, <i>Trachurus japonicus</i>	2	0.1-4.3 0	
Eel, <i>Anguilla japonica</i>	1	2.6 0	
Sea perch, <i>Lateolabrax japonicus</i>	1	542 0	
Red sea bream, <i>Fagrus major</i>	1	0.1 0	
Crab, <i>Portunus trituberculatus</i>	1	1.8 2.8	

[1 figure, 3 tables, 7 references]

0.38

The electrophoretic patterns given by the crude extracts from heart, lung, liver, and skeletal muscle of fur seal (*Callorhinus ursinus*), blue-white dolphin (*Stenella caeruleo-alba*), rough-toothed porpoise (*Steno bredanensis*), Dall's porpoise (*Phocoenoides dalli*), and True's porpoise (*P. truei*) were quite similar. All contained detectable amounts of five LDH isozymes; none contained other LDH isozymes. Although the quantitative distribution of the five isozymes in the various tissues differed somewhat, their mobility was identical.

In contrast, the patterns given by the crude extracts from the skeletal muscle of 39 species of fish varied considerably in both the number and the electrophoretic mobility of both LDH and MDH isozymes, as shown below.

Order	Number of species analyzed	No. of isozymes		Distance of migration (cm.)*	
		LDH	MDH	LDH	MDH
Clupeida	4	2-5	2-9	1.0	1.3
Cyprinida	1	3	9	0.6	1.5
Percida	23	2-9	2-6	0.4-1.3	1.1-1.7
Tetraodontida	4	1-2	3-7	0.4-0.7	1.3-1.7
Cottida	5	1-5	1-4	0.8-1.1	1.3-1.5
Pleuronectida	1	1	2	0.8	1.3
Lophiida	1	1	8	0.8	1.3

\* Toward the anode of the most rapidly migrating isozyme present in the extract.

The genetic basis and the physiological meanings of the findings are discussed. [1 figure, 1 table, 2 plates, 11 references]

LB

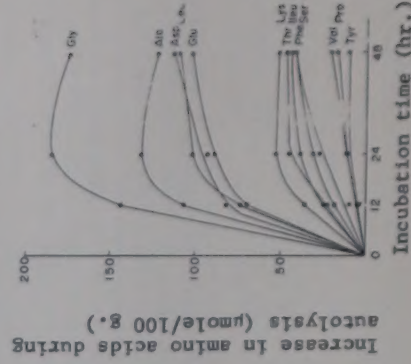
0.322 (7.52)

Amounts of free amino acids in mackerel muscle (mg. %)

Amino acid	Determined by	
	Average GLC	Ion exchange
Gly	6.09	4.54
Ala	12.2	14.9
Asp	5.62	---
Leu	3.05	3.14
Glu	18.3	15.3
Lys	20.3	18.0
Thr	4.41	5.63
Ileu	2.93	2.14
Phe	2.12	1.85
Ser	1.05	---
Val	3.82	3.46
Pro	---	1.83
Tyr	2.58	2.99
Met	2.57	2.31
His	---	892

[5 figures, 4 tables, 7 references]

Production rate of amino acids from mackerel muscle homogenate during aseptically autolysis



LB



(8.9)

Maier, Hans Gerhard (Institut für Lebensmittelchemie der Universität 6 Frankfurt/Main, Georg-Voigt-Strasse 16, Germany)  
Angewandte Chemie (International Edition) 2, No. 12, 917-126 (December 1970)

The term "flavoring substance" as used in this report refers to the chemically definite compounds that cause the flavor of foodstuffs. The "threshold value" (limiting concentration--the lowest concentration of the substance at which its presence is recognized in comparison with a blank test) is influenced by other flavoring substances. For example, the odors of two flavoring substances may cancel each other out in suitable mixing ratios, or the odor of one component may be altered by other components having only a weak odor or no odor at all. Therefore, all volatile substances, with the exception of the odorless "permanent gases" and water, should be regarded as flavoring substances.

The odor of most foods is produced by mixtures of many volatile flavoring materials. The flavoring substances in living material are biosynthesized by widely differing routes. Microbial, enzymatic, oxidative, and thermal changes occur on death and during the storage and processing of the materials. The breakdown of fats and the Maillard reaction are particularly important to the formation of flavoring substances.

In this article the author discusses the general pathways for the formation of flavoring substances found in foodstuffs, the principal flavoring substances (aliphatic and alicyclic compounds, aromatic and heterocyclic compounds), the fixation of the flavoring substances, and the outlook.

(over)

Anonymous ["A.F.M."]

Protein from Oil

G. H. Evans (Protein and Microbiological Research, British Petroleum Company) Chemistry and Industry No. 50, 1597-1598 (December 12, 1970)

At a joint meeting of the Heavy Organic Chemicals Group and the Food Group of the Society of Chemical Industry (held November 17, 1970), Mr. Evans reported on the work British Petroleum (BP) has been doing in the production of protein from oil. He explained the requirements for cell growth when yeasts or bacteria are grown on a hydrocarbon substrate and discussed the efficiency (as measured by harvesting ease) of three fermentation processes. The resulting product--a "new, natural" protein, the lecturer emphasized, not a simulated, synthetic food--is from 60 to 70% protein; thus it is quite similar to fish meal or soya meal. It is produced much more quickly and is of a more consistent quality than are agricultural proteins; however, it is deficient in methionine and not, up to now, palatable to human consumers. In contrast, animals accept the product readily and, since it has been proved toxicologically harmless and nutritionally adequate for the needs of several generations of them, it becomes a source of dietary protein as economically produced as is agricultural protein. BP is operating several pilot plants in Great Britain, whereas in Japan the fermentation companies are producing this type of protein.

(7.591) III. ON THE ESTERASE AND LIPASE IN THE FISH MUSCLE

Morishita, Tatsuo, and Takashi Takahashi  
Journal of Faculty of Fisheries, Prefectural University of Mie 8, No. 1, 41-51 (December 20, 1969) (In Japanese; figures, tables, and résumé in English)

The dark muscles of yellowtail (*Seriola quinqueradiata*), rainbow trout (*Salmo gairdneri irideus*), mackerel (*Scomber japonicus*), and stone flounder (*Kareius bi-coloratus*) were separated from the lighter muscles, and the lighter muscles from the back of each species were divided lengthwise into five equal segments. The seven types of muscle (dark, lighter abdominal, and five sections of lighter dorsal muscle) were homogenized in cold water; the homogenates were used to determine enzymatic reaction. Substrates used were  $\beta$ -naphthyl-acetate,  $\beta$ -naphthyl-laurate, and  $\beta$ -naphthyl-stearate. Optimum pH for hydrolysis of the substrates by the fish muscle extracts was determined at 30° C. for 20 min. on acetate and for 3 hr. on laurate and stearate; optimum temperature was determined by hydrolyzing each substrate at the optimum pH for 3 hr. at various temperatures.

Optima for hydrolysis of  $\beta$ -naphthyl-esters by the esterase were pH 7 or 8 at 30° to 35° C. on acetate and pH 8 or 9 at 30° to 40° C. on laurate; by the lipase, about pH 5 at 30° to 40° C. on stearate and about pH 5 at 25° to 35° C. on laurate. Esterase and lipase activity varied with the muscle and the fish species--enzymatic activity of dark muscles being higher than that of the lighter muscles and esterase activity of the lighter abdominal muscles (except those of yellowtail) being higher than that of the other light muscles. In the segments of lighter

(over)

(9.19)(9.13)

Findlay, G. M., and A. S. W. deFreitas (Division of Biology, National Research Council of Canada, Ottawa 7, Canada)  
Nature 229, No. 5279, 63-65 (January 1, 1971)

Numerous authors have suggested that the storage of DDT in the adipocyte lipids of birds and animals is an effective detoxifying mechanism for the pesticide. Storage in adipose tissue, however, is transient, since the release of DDT and its metabolites into the circulating fluids--normally a slow process--probably speeds up when lipid mobilization accelerates during periods of starvation or of activity. Many authors have demonstrated that starvation is followed by higher levels of DDT in the blood, altered concentrations of DDT in the tissues, and increased excretion of DDT by the animal. However, no one has quantitatively defined either the mobilization rate or the end state of the mobilized pesticide. The present authors quantify the amounts of DDT and its metabolites that are mobilized from adipose tissue and simultaneously accumulated in muscle tissue.

<sup>14</sup>C DDT was dissolved in corn oil at concentrations of 0%, 0.15%, 1.5%, or 16%, and each solution was enclosed in gelatin capsules at a dose of about 64 mg. per capsule. Four groups of homing pigeons, 12 to a group, were force-fed two of the capsules a day for 16 days. The resulting amount of DDT ingested per bird was 0, 3.101, 32.07, or 335.0 mg. After dosing was completed, half the pigeons from each group were killed and the total body burden of DDT and its metabolites was determined. The other six pigeons in each group were caged individually at 6° C. with water but no food available. When each bird had lost between 18 and 20% of its original body weight (a condition that does not impair its ability to regain

(over)



This volume explores the physical laws that govern the responses of food materials to all the factors affecting them, from the production stage to the consumer. It describes the structure, the physical characteristics, and the mechanical properties of economic biomaterials and illustrates the application in the food industry of these data to the design of machines, the operation of processes, and the evaluation of quality. The biomaterials examined include grains, seeds, forage, silage, fruits, vegetables, meats, eggs, and dairy products.

LB

Research on flavoring substances in foods is going in three directions: (1) analysis of flavors, (2) formation of the flavoring substances, and (3) fixation and alteration of flavoring substances.

## MEAT PRODUCT MANUFACTURE

Karmas, E.  
Meat Product Manufacture, 270 pp. (1970) Noyes Data Corp., Park Ridge, New Jersey.  
Price \$35.  
Food Technology 25, No. 1, 87 (January 1971)

This is the second of a series of three reviews (in three volumes) on the manufacture of meat. The first volume was called "Fresh Meat Processing." The third volume will deal with the manufacture of sausage. The book describes 108 processes developed since 1960. The information is based on U.S. patents relating to the manufacture of meat.

A literature survey of mincing processes showed that (1) tests of meat-mincing equipment have been limited to calculations of energy consumption and (2) evaluation of the finished products, particularly of frankfurter-type sausages, has been restricted to organoleptic tests of quality, extreme values for stickiness and viscosity, and the ultimate yield stress of the emulsion after a given processing time. The authors report the quantitative results they obtained by using various chopping bowls, chopping times, and water concentrations. They stress the need for an objective, automatic instrument that can be used to determine the degree of doneness of the minced meat.

Gorbatow, A. W., and W. M. Gorbatow  
Fleischwirtschaft 50, 297 (1970)  
Food Manufacture 45, No. 10, 97 (October 1970)

RHEOLOGY OF MINCED MEAT DURING CHOPPING

$$0.6$$
  
$$(6.54)(0.12)$$

### 0.38

#### LYSOSOMAL CATHEPSINS OF CHICKEN SKELETAL MUSCLE: DISTRIBUTION AND PROPERTIES

Caldwell, Kathryn A., and Ok-ko K. Grosjean (Western Regional Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Albany, California 94710)

The experiments reported in this article were designed to characterize more definitely the catheptic [cathepsins are enzymes (mixtures of proteinases and peptidases) in living cells that have a hydrolytic action in living or dead animal tissues and a synthetic action in the living cell] activities present in skeletal muscle and to examine their cellular localization. The authors determined quantitatively the activities of cathepsins A, B, C, and D in extracts of chicken skeletal muscle by using synthetic peptides and denatured hemoglobin as substrates. They found that muscle cathepsins appear to be associated with the lysosomes. [3 figures, 6 tables, 13 references] FTP

dorsal muscles, both esterase and lipase activity decreased as the distance from the head increased--up to the segment nearest the tail, where the activity increased again. All the enzymatic activity measured in this study was markedly lower than that measured in earlier studies of esterolytic activity in fish organs. [8 figures, 4 tables, 4 references] LB

0.38 (7.591)

normal weight should food become available), it was killed; blood was collected and separated into plasma and erythrocytes; brain, liver, heart, the omental fat pad, and 10 g. of breast muscle were removed; and the remaining tissues were ground up together. Total lipid was extracted from each sample, and the 14C content of the co-extracted DDT and its metabolites measured.

Starvation and cold did not change the percent of lipid or the net DDT content of erythrocytes, plasma, liver, or brain of the pigeons that ingested 32.07 mg. DDT. (The authors also measured and tabulated stress-induced changes in the other experimental birds.) The percent of lipid in the heart decreased, but no net change occurred in DDT content. During starvation, both the lipid and the DDT content of the omental fat pad decreased markedly; in contrast, the DDT content of the breast muscle increased, but the lipid content remained unchanged. The content and concentration per gram lipid increased in leg muscle as it did in breast muscle. These findings show that the principal changes in DDT content during starvation occur in adipocyte lipid and muscle tissue.

The increase in DDT content of total muscle during starvation was assumed to represent the net DDT movement into carcass muscle; the decrease in total carcass DDT to represent the amount of DDT irreversibly cleared from the system; and the sum of the two to give a minimum estimate of DDT mobilization from adipocyte lipid. The part of the mobilized DDT that was not cleared from the system was relocated only in the muscle. The authors suggest that the failure of the DDT to relocate in brain, liver, heart, or blood may be an important protective mechanism. Although DDT accumulation in muscle tissue could cause degenerative changes, it could also be harmless, since the DDT is probably located in the intracellular lipid droplets. [3 tables, 16 references]

LB

0.39 (9.19)(9.13)



Miyake, Masato, Akiko Tanaka, and Ken Kawakami (Central Research Laboratories, Ajinomoto Co., Inc., Kawasaki, Japan, and Faculty of Fisheries, Prefectural University of Mie, Edobashi, Tsu, Mie Prefecture, Japan)  
Report of Faculty of Fisheries, Prefectural University of Mie 6, No. 3, 159-168 (December 20, 1969)

III. EFFECTS OF BASIC AMINO ACIDS ON THE QUALITIES OF FROZEN FISH MEAT PASTE AND FISH MEAT SAUSAGE, pp. 159-163.

In 1966, Miyake et al. reported that the elasticity of kamaboko jelly is improved by addition of amino acids to the surimi (the minced fish that is the basic ingredient of kamaboko). They noted that the basic amino acids were particularly effective. In subsequent reports, they also noted the tenderizing and yield-improving effects of amino acids on canned meats. In the present report, they discuss the effect of arginine and lysine on the quality of frozen and fresh surimi. Surimi prepared from Alaska pollock (*Theragra chalcogrammus*), horse mackerel (*Trachurus japonicus*), yellowfin tuna (*Neothunnus albacares*), black marlin (*Makaira mazara*), and shark (*Isurus glaucus*) were treated with various combinations of sugar, salt, and arginine and stored, along with untreated surimi, at -20° C. At varying periods throughout the year, samples of the frozen surimi were thawed, made into kamaboko, and tested for gel strength. Although the additive composed of 10% cane sugar, 3% common salt, and 1% arginine (each percentage being the ratio of preservative to amount of meat) was somewhat more effective in preventing denaturation of the protein than was the same additive with the sugar omitted, the authors recommend use of the latter because it does not introduce a sweet

Bregman, J. I. (WAPORA Inc., 1725 DeSales St., N.W., Washington, D.C. 20036) Chemical Engineering 78, No. 2, 83-87 (January 25, 1971)

The Federal Water Pollution Control Act is designed to protect our waters equally for all legitimate users. In other words, industry must not be allowed to introduce pollution that will destroy fish and wildlife nor must the standards set for the propagation of fish and wildlife be so restrictive that they destroy, or impose intolerable burdens upon, the industries that are co-users of the water. Basically four types of temperature standards must be met by water users: (1) the maximum-temperature value (the natural temperature of the water plus a small amount of artificial heat), (2) the temperature increase (the allowable rise in the temperature of water without the addition of artificial heat), (3) the rate of temperature increase (the increase in temperature within a given time; although this standard is functionally sound, since aquatic life is affected more by the rate than by the amount of temperature increase, it is not applied very often because it is very hard to monitor), and (4) the mixing zone (the zone in which hot effluent and the natural waters intermingling; temperatures are unrestricted in this zone--only the size and shape of the zone itself are defined). Because temperature standards are becoming more restrictive and more actively enforced, many firms that have delayed installing control systems will soon be pushed headlong into action. They may find that they must take the quickest approach to thermal control, not necessarily the most efficient, the most economical, or the most technologically innovative.

(over)

Anonymous  
FAO Report Series 46A, 161 pp. (1970) Unipub Inc., 650 First Avenue, New York N.Y. 10016, Price \$1.00.  
Food Technology 25, No. 1, 86 (January 1971)

The material in this book is the record of the deliberations of the Joint FAO/WHO Expert Committee on Food Additives (Rome, Italy, May 27-June 4, 1969). The book contains data on the toxicology of 77 food additives. Information on each additive consists of biochemical aspects of toxicity, evaluation of acceptable levels of intake, and references for the data presented. FTP

Cinadr, Bernard F., Jerome K. Curley, and Arthur T. Schooley (Chemical Engineering Department, B. F. Goodrich Research Center, 9921 Brecksville Road, Brecksville, Ohio 44141)  
Chemical Engineering 78, No. 2, 62-76 (January 25, 1971)

A miniplant is the smallest scaled process system that will produce a product representative enough for meaningful evaluation and data accurate enough for use in the design and operation of a commercial-scale plant. In addition to the obvious economic reasons for building and operating a miniplant, there is yet another--since it is easier to build, operate, and revise than is a conventional pilot plant, new processes can be developed and tried in less time and at less cost.

This report is divided into three sections. In the introductory section, the authors discuss the basis for design, and the determination of function, scope, and size; the location and layout of the plant, housing, equipment design, construction materials, process piping, instrumentation and automation, waste disposal and pollution control; operating techniques and process flowsheets; personnel, safety and manpower requirements; cost and economic evaluation; and data collection and analysis. Tables are given comparing the advantages and disadvantages of miniplants relative to pilot plants and listing general rules for setting up a miniplant. In the section on selecting equipment, the authors cover process and mechanical considerations, electrical problems, overdesigning and equipment mismatch, and cyclic operation to correct mismatches. A table lists various types of miniplant equipment and the companies that manufacture each. The third section

(over)



Journal of the American Dietetic Association 58, No. 2, 127-132 (February 1971)

FTTP  
[5 tables, 14 references]

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North America [9 references]

IP

Pennsylvania)

## 0.7 DIETARY REGULATIONS AND FOOD HABITS OF MUSLIMS

0.6 (0.322) (6.54)

[1 figure, 1 table, 5 references]

In meat sausage, the protein and water form a matrix that encapsulates the fat, the meat emulsion having characteristics similar to those of an oil-water emulsion. Some emulsifying agent, then, is necessary. Some manufacturers use polyphosphates, which greatly enhance retention of fat and moisture in the cooked product. But phosphates may upset the nutritional equilibrium between calcium and phosphorus in the human body; they are known to discolor the product.

LB

[2 cables, 2 references]

[8 figures, 3 tables, 22 references]

resins and gel, organic and inorganic muds, dusts, and general wastes.  
[7 figures, 10 references]

Kémikusok Lapja, No. 5, 257-261 (1970) (In Magyar International Chemical Engineering, 11, No. 1, 1-5 (January 1971) (a quarterly journal of translations from Russia, Eastern Europe, and Asia, published by the

# THE DISPOSAL OF WASTES IN THE CHEMICAL INDUSTRY

This article describes three presently used methods of dissipating heat generated by steam-electric plants, both fossil-fueled and nuclear-fueled: (1) once-through cooling, with either layer or mixed-jet discharge; (2) cooling impoundments, including those with spray systems; and (3) cooling towers, both wet (in which the temperature of the discharge is lowered by evaporation) and dry (in which the temperature is lowered by conduction and radiation), with air being moved either by natural draft or by mechanical draft. It covers the source of the cooling water, the amount of water required for different condenser flows and withdrawal rates, the physical and hydraulic characteristics of the effluent and the receiving water, the land or surface area required for heat transfer under various conditions, and the amount of dissipation achieved. It mentions auxiliary equipment required, and it details the advantages and disadvantages of each system (including the effect on environmental features other than water). Typical costs for each system when installed at fossil-fueled and nuclear-fueled steam-electric plants are tabulated.

The conclusion from all this analysis is that cooling towers, no matter how expensive, are the only present means of meeting temperature standards. In the future, however, more economically desirable approaches to thermal-pollution control will be taken. It is senseless, the author says, for one industry to spend millions of dollars dissipating energy while at the same time other industries are spending money acquiring it. The logical solution is to tie together industries that need energy and utilities that have an excess. Giant desalting units can be combined with nuclear-powered electric plants; satellite industrial and residential areas can be developed around power plants; or nuclear utilities can be made the center of industrial-residential-commercial-agricultural complexes where plants and animals are grown faster and in more abundance. Thus waste heat will be turned into a useful commodity, not a liability. [4 tables] 13

LB



# PUTTING SOUND-WAVES TO WORK

0.8  
(0.6)(9.19)

Browning, Jon E. (Chemical Engineering, McGraw-Hill Building, 330 West 42nd St., New York, N.Y. 10036)

Chemical Engineering 78, No. 2, 32-34 (January 25, 1971)

The three basic means of producing a sonic wave are (1) with a static generator, or whistle; (2) by converting electrical energy into mechanical vibrations; and (3) with a dynamic generator, or rotary siren. The rotary siren has been used for several decades to agglomerate and remove airborne particulates, an application of particular significance in the control of air pollution. But the most promising and versatile of the wave-producing systems are the other two. Among the processing uses of sound energy that have been patented are those concerned with catalytic reactions, extraction of fats, reaction acceleration, organic chemical effects, and pickling. This article describes some of the sonic devices being studied, mentions their possible industrial application, and lists the research agencies developing and evaluating them.

The gas whistle directs compressed gas through a nozzle into a resonator cavity; the gas impinges against the lip of a resonator, causing the mass of gas contained in the cavity to vibrate; the waves from the resonator reflect off the nozzle face in a parabolic pattern. A patented variation of this classic device has proved particularly effective in improving combustion and controlling air pollution from oil burners. Other possible applications include deodorizing, evaporative cooling, flame spectroscopy, grain drying, humidification, catalyst reactivation, spray drying, smoke and dust suppression, and waste incineration.

The liquid whistle generates sound waves by impinging a high-velocity liquid stream on an obstacle. The resulting standing wave can be used to create cavitation, turbulence, or shear. Mixers using this system are suitable for a wide range (over)

# FRESHWATER FISH -- POLLUTION BY INTRODUCTION

1.011  
(9.19)(1.92)

Anonymous

Nature 229, No. 5281, 154 (January 15, 1971)

E. A. Lachner, C. R. Robins, and W. R. Courtenay, Jr., in Smithsonian Contributions to Zoology 59, No. 1 (1970), discuss the pollution of native North American biota by alien plants and animals. They point out that 25 nonnative species of fish have become established since their introduction into the United States and Canada. Some have been here for a long time. The brown trout, for example, was introduced in the 1880's; the carp in the 1830's. Both were officially sponsored as having food or sporting value. Yet today the carp is considered one of the most disastrous of all aquatic introductions--some states having to spend considerable amounts of money in an effort to control them.

A near relative, the Asiatic grass carp (*Ctenopharyngodon idella*), is being kept in ponds by many federal, state, and local agencies. Because of its voracious appetite for aquatic vegetation, it was supposed to be a "cheap" means of keeping waterways open. The authors conclude that its proliferation, particularly in the south, is a serious possibility and could lead to establishment of a pest even more harmful than the carp. They point out that the carp was introduced and promoted in the early 1800's by the federal authorities, so the same sponsorship for the grass carp is no guarantee that its introduction will not prove to be expensive, also.

As for native trout, so-called fisheries management by introduction, trans-plantation, and hatchery interbreeding has effectively destroyed many of the west coast populations. Among the species now extinct are the emerald trout (*Salmo smaragdus*) of Pyramid Lake, Nevada, and the royal silver trout (*Salmo regalis*) of Lake Tahoe, on the border between California and Nevada.

(over)

1.013  
(2.6)(9.2)

Vergara G., Nizar E.  
Estudios e Investigaciones, No. 4, 2 + 48 pp. (1970)

In the Prologue, Dr. Cristopher J. Molteno, who translated the original report, says: "In Colombia it is generally recognized that fish is a valuable food whose consumption deserves to be encouraged in order to promote the level of nutrition within the country. However, what is restricting its utilization is not so much its abundance, since many thousands of tons are annually being dumped, as the fact that in getting it to the market its cost is raised to the point where it can no longer be bought by those who are most in need of it.

"Dr. Nizar Vergara in this comprehensive and worthwhile study of the marketing and consumption of fish and fish products in Bogota has provided the reader with such information as channels of distribution, methods of transport, volumes of sales, marketing margins, seasonal demands, income-group preferences, and consumption levels. This information deserves to be carefully studied by those who may soon be concerned with organizing a marketing system which is designed to reduce distribution costs so that good quality fish can be sold to the lower income groups at reasonable prices."

The author's abstract reads as follows:

"The first part of this paper describes the principal aspects of the commercialization of fishery products in Bogota, it includes suppliers, transported volumes, channels and marketing margins prices, wholesale and retail distribution. (over)

1.0145  
(2.117)(2.119)  
(9.7)

Semyonov, Igor M. (Chief State Shipping Safety Inspectorate, Ministry of Fisheries, U.S.S.R.)

World Fishing 19, No. 11, 45-46, 49 (November 1970)

In Czarist Russia, commercial fishing was done only in rivers, lakes, and coastal seas and from sailing or row boats, small tugs or steamers. Thus when the Soviet state began to develop its sea fisheries, it could begin with a clean slate. Instead of copying the designs of fishing vessels used in countries whose fishing industries were developed, they created seagoing vessels designed not only for efficiency but for crew comfort and safety. This article describes some of the measures taken to ensure shipping safety and the safety of life at sea.

Every day more than 100,000 crewmen operate hundreds of Soviet trawlers and seiners and dozens of tender ships, floating factory ships, and refrigerator ships in the Atlantic, the Pacific, and the Indian Ocean. Every vessel is fully equipped for both radiotelephony and long-distance radiotelegraphy; each has at least one radio operator--the larger ships have several. Every vessel in a flotilla (and the entire Soviet fishing fleet is divided into flotillas, consisting of mother ships or factory ships with catcher boats, special rescue vessels, and sometimes research ships) must report its position, the fishing conditions in its area, and any need for assistance to the flagship every 4 hours. Aboard the flagships are expert consultants on navigation and machinery as well as skilled medical staffs to man the dispensaries and hospitals.

(over)



Despite the complete line of electric and radio navigation facilities and equipment on board the vessels, safety at sea can be ensured only if the officers and men are adequately trained and supervised. To that end, 15 officer-training schools, with an enrollment of over 30,000, are operated in all big sea-fishing ports to provide instruction to navigators, ship's engineers, electrical engineers, chief radio officers, and refrigeration engineers. Only those officers who have had this training may hold command posts on seagoing trawlers. Before any captain can take his vessel to sea, the chief harbor master must certify that the required safety devices (fire-fighting equipment, inflatable vests, safety buoys, life rafts, and lifeboats and their provisions and equipment) are available and serviceable; that the ship is in complete technical order; that the established complement of men is on board; and that all ship's officers are qualified to hold their posts, as shown by their diplomas and sailing seniority. Each seaman is given a medical inspection to certify his fitness for work at sea. Once at sea, the ship and its crew may be inspected at any time of the day or night for their ability to respond to emergency situations and for their observance of established safety regulations (for example, the way the holds are loaded or the fish piled on deck). Men caught drinking alcoholic beverages are expelled from the fleet.

On most ships, seamen live two to a cabin. They are entitled to four free meals a day, served in spacious dining rooms and even during the night watches. Cooks are specially trained in the fishing ports. Since the seamen must work 7 days a week while at sea, they are entitled to 4 free days in port for every month they spend at sea. After 1 year, a seaman may take his annual paid leave, with his family, at a rest center or holiday resort. Several trawler fleet organizations operate their own hotels, rest homes, and sanatoria for seamen; these facilities are located in the southern areas of the Soviet Union. [5 photographs] L8

.013 (2.6) (9.2)

"The second part shows sampling results of family fish consumption in Bogotá. The third part (Appendix) includes the methodology employed for preparing the sample and the way of estimating the principal variables."

[9 photographs, 2 diagrams, 19 tables, 1 appendix, a list of common and scientific names of commercial species of fishes, and a 9-point set of conclusions]

reprinted in part

Vol. 1 reviewed in Commercial Fisheries Abstracts 23, No. 10, 5 (1970) ] deal primarily with marine ecology; Vol. 2 with terrestrial and fresh-water ecology. L

These volumes, published for the Scientific Committee on Antarctic Research, contain 81 papers on all aspects of Antarctic ecology--descriptive, quantitative, behavioral, and functional. The papers are grouped into 14 categories; each has a short introduction, each is followed by an edited discussion, and many are illustrated with photographs, figures, and maps. Subject and author indexes are contained in Vol. 2.

These volumes published for the Scientific Committee on Atomic Energy, Nature 279, No. 5282, 278-279 (January 22, 1971)

Press: London and New York (1970), 120s. and 100s.  
M. W. Holdgate (editor)

Newbould, P. J. (reviewer)

ANTARCTIC ECOSYSTEMS

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However, the greatest biotic pollution in North America is in Florida. The authors describe that state as a biological cesspool of introduced life. Of the 37 species of alien vertebrates now established there, 10 are fish species. Several species of cichlid from South America and Africa are thriving at the expense of native fish. Some were released "to improve sport fishing"; others accidentally escaped from the aquaria of fish dealers. The Asiatic walking catfish (*Clarias batrachus*) is one of the latter. This fish grows rapidly, reproduces prolifically, maintains itself in dense populations, and distributes itself easily throughout waterways or overland. The authors note that a member of the Florida Game and Fresh Water Fish Commission reportedly has said that this fish is out of control and that no practical method of eradicating it is available.

[1 figure, 10 references]

Reprinted in part

Unlike our previous reports in this series (Kramer and Smith, 1970 a, b, c) which briefly discuss the potential for each of the fisheries described, this deals only with the seasonal and geographic characteristics of the Pacific mackerel resource and describes briefly its decline and the result.

The fishery for the Pacific mackerel (*Scomber japonicus*) was until 1996 the third largest in southern California, surpassed only by those of the Pacific sardine and tuna. This mackerel had declined until, in 1970, a 2-year moratorium was implemented by the California Legislature in an attempt to conserve the remainder of the resource and to assist in its revival.

(1.0114) CALIFORNIA CURRENT REGION-IV. PACIFIC MACKEREL  
Kramer, David, and Paul E. Smith (Bureau of Commercial Fisheries Fishery-Oceanography Center, La Jolla, California 92037)  
Commercial Fisheries Review 32, No. 10, 47-49 (October 1970)

1.11	SEASONAL AND GEOGRAPHIC CHARACTERISTICS OF FISHERY RESOURCES.	(61'6) (9'0)
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of continuous chemical reactions, including those occurring during food, paint, and textile processing. At least 65% of the business of one company that makes a liquid whistle is in the chemical processing industries--most of it homogenizers.

Converting electrical energy into mechanical vibrations requires (1) an electromechanical transducer, which converts electromechanical energy into high-frequency mechanical vibrations; (2) a coupling, which, rigidly attached to the transducer, converts the output to the motion required; and (3) a horn, which directs the sound waves to the desired point. With this system, similar or dissimilar materials or plastics can be fusion welded, rivets driven, and concrete mixed (the resulting product has a compressive strength 300% greater than that of conventionally mixed concrete). Other uses being investigated are friction reduction on a wide variety of cutting blades and accelerating the growth rate of bacteria. The key to this energy-conversion system is its use of a constant-frequency power source, which costs about \$400/kw., rather than a variable-frequency power source, which costs about \$2,000/kw.

Makers and marketers of sonic processing equipment have three common complaints: (1) the customer who comes shopping has not bothered to investigate how much work, so he has to be educated before the seller can make any kind of meaningful demonstration of the equipment; (2) people who have had unpleasant experiences with the expensive, unreliable devices made when sonic technology was in its infancy refuse to believe that the technology has matured; and (3) most potential users think in terms of replacing an existing piece of hardware with sonic equipment rather than recognizing that, since the form of energy doing the work is being changed, the most economical approach to plant conversion is from a systems engineering standpoint. [2 tables]

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1.30 THE CARRYING CAPACITY FOR JUVENILE SALMONIDS  
(9.12) IN SOME NORTHERN CALIFORNIA STREAMS

Burns, James W. (Inland Fisheries Branch, California Department of Fish and Game) California Fish and Game 57, No. 1, 44-57 (January 1971)

Standing crops of juvenile coho (silver) salmon (*Oncorhynchus kisutch*), steelhead rainbow trout (*Salmo gairdneri*), and coast cutthroat trout (*Salmo clarki*) were examined in seven coastal streams to define the natural carrying capacity of these streams, and to develop methods of population comparison and prediction which could be used to determine the effects of road construction and logging on salmon and trout production.

Biomass per unit of surface area was the best method of expressing carrying capacity, because biomass was better correlated with stream surface area than with other parameters tested. Volume of streambed sediments, total dissolved solids, alkalinity, and total phosphate in six streams were not satisfactory predictors of carrying capacity. Only living-space variables correlated significantly with biomass. Not all streams reached carrying capacity in the summer and salmonid biomass was highly variable. Even with 3 years of prelogging study, it would be difficult to attribute a change in carrying capacity under 50% to anything but natural variation. [10 tables, 25 references]

Author's abstract

1.86 RED CRAB, GERYON QUINQUEDENS  
(2.15) (2.4) 1) RECOMMENDED LIVE STORAGE TEMPERATURES  
(9.15) 2) RESISTANCE TO GAFFKEMIA, THE LOBSTER DISEASE

Stewart, James E. (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia), and John W. Cornick Fisheries Research Board of Canada New Series Circular No. 40, 2 pp. (December 16, 1970)

Following discovery of commercial quantities of red crab in the cold (40° to 41° F.) deep water along the edge of the Continental Shelf, the authors undertook to determine two essentials about this crab: (1) the maximum live storage temperature the crab could tolerate and (2) the susceptibility of the crab to the lobster disease gaffkemia, also known as blood disease or pink tail.

1. Vigorous, freshly caught red crabs were kept for 60 days in sea water ranging in temperature from 59° to 54° F. Within the first few days, about half the crabs died at 59°; 14% died at 57°; and 7% died at 54°. Although 54° is appreciably higher than the temperature of the crab's normal habitat (and even higher than the 50° F. apparent maximum for snow crab, *Chionoectes opilio*), the authors recommend that live red crabs be held in flowing sea water at this temperature, or at lower temperatures.

2. Red crabs injected with *Gaffkya homari*, which causes gaffkemia in lobsters, were unaffected by the bacterium. However, at the end of the 60-day test period, the bacterium could be reisolated from 40% of the crabs, and particularly from those kept at the higher temperatures. The authors conclude that although the red crab is resistant to gaffkemia, it could be a carrier.

(over)

1.87 DISEASE AMONG STORED LOBSTERS (GAFFKEMIA)  
(2.15) (2.4)  
(9.15)

Stewart, James E. (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia), and John W. Cornick Fisheries Research Board of Canada New Series Circular No. 41, 5 pp. (December 16, 1970)

Gaffkemia, the fatal bacterial infection of lobsters, is caused by *Gaffkya homari*. It affects only lobsters and certain species of crab--never, as far as is known, any other animal. A 1-lb. infected lobster will carry from 200 to 300 billion *G. homari* in its blood and tissues; a single drop of its blood can contain as many as 50 million *G. homari*, even one of which can cause fatal infection in another lobster. Since the disease increases the clotting time of the lobster's blood, an infected lobster can bleed to death if wounded; and even if not, it can become extremely weak and die within minutes of being removed from the water. A pin prick of a wound, or even a chewed antenna, is sufficient entryway for the bacterium. For these reasons, the authors recommend the following:

1. Handle lobsters carefully--avoid wounding.
2. Store only lobsters that are vigorous.
3. Use some method other than plugging to keep claws closed. (Although rubber bands do not cause wounds, they can slip off and leave the claw free for fighting. If they are used, they must be checked at regular intervals.)
4. If at all possible, keep lobsters from different areas separate.

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2.0 RIGOR TENSIONS AND GAPING IN COD MUSCLE

Burt, J. R., N. R. Jones, A. S. McGill, and G. D. Stroud (Ministry of Technology, Torry Research Station, Aberdeen, Scotland) Journal of Food Technology 5, No. 4, 339-351 (December 1970)

"Gaping" is a term applied to a phenomenon that occurs in the musculature of fish. It involves the development of holes or slits between the muscle segments (myotomes) of fish fillets as a result of the breakdown of the minute tubes of connective tissue that come from the connective tissue sheets (myocommata) and run between and around the muscle cells. From the standpoint of appearance and utility, fish fillets that show gaping are of inferior quality. The present study was part of a larger program to determine the origins and cause of gaping in fish. The information in this paper deals with the effects of temperature on the breaking stress of cod muscle fibers and of muscle connective-tissue systems and on the effects of temperature and anoxia on the development of rigor tension in cod muscle fibers.

The researchers found that the immediate cause of gaping in fillets cut from cod that have been accelerated into rigor mortis by high temperatures is a combination of the greater rigor tensions generated at higher temperatures and the lowering of the inherent strength of the tissues. These effects proceed to such an extent at higher temperatures (from about 20° upwards to 30° C.--the upper limit of the temperature range used) that the muscle literally pulls itself to pieces. The magnitudes of the rigor tensions produced at a given temperature were

(over)



1.86 (2.15)(2.4)(9.15)

Information about red crab processing and plant layout can be obtained either from the Industrial Development Branch of the Department of Fisheries and Forestry or from the Fisheries Inspection Laboratory, Department of Fisheries and Forestry, Halifax, Nova Scotia.

The following technical reports (by S. Varga, A. B. Dewar, and W. E. Anderson of the Applied Research and Development Laboratory, Inspection Branch, Maritimes Region, Canada Department of Fisheries and Forestry, P.O. Box 550, Halifax, Nova Scotia) are also available:

- No. 1 - Precooking required for red crab sections (October 1969)
- No. 2 - Survival of red crabs held on ice and refrigerated air (December 1969)
- No. 3 - Effect of post mortem spoilage on the quality of frozen and heat processed red crab meat (February 1970).

Additional publications of potential usefulness include:

- 1. The Commercial Potential of the Deep Sea Red Crab, by A. Holmsen (Department of Food and Resource Economics, College of Agriculture, University of Rhode Island, Kingston). Occasional paper 63-138 (1968).
- 2. Red Crabs in Your Future, by T. L. Meade (University of Rhode Island Agricultural Experiment Station, Cooperative Extension Service, Kingston). Rhode Island Resources 16, No. 1, 1-3 (1970).
- 3. Canadian Atlantic Crab Resources, by D. G. Wilder (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick). General Series Circular No. 50 (September 1966).

1.85

LA CREVETTE PROFONDE (PANDALUS BOREALIS)  
DANS LA REGION DU NORD-OUEST ATLANTIQUE  
[THE DEEP-SEA PRAWN (PANDALUS BOREALIS)  
IN THE NORTHWEST ATLANTIC]

Fontaine, Bernard

Science et Pêche, No. 197, 16 pp. (November 1970) (In French)

This report has the following sections:

Distribution - along the southern coast of Labrador and the north-northeast coast of Newfoundland, in the Gulf of St. Lawrence, along the southern coast of Newfoundland and in the St. Lawrence channel, along the coasts of Nova Scotia. Factors affecting distribution - the nature of the bottom (they occur only on muddy bottoms, never on rocky, gravelly, or coarse sandy bottoms) and the temperature (-1° C. to 14° C., with the optimum being about 8° C.); depth is of no consequence.

Biology of deep-sea prawns in relation to the fishery - size, weight, reproductive capacity, migrations.

The deep-sea-prawn fishery - existing fisheries (their location), gear used, yield (by geographical area), fishes taken along with prawn.

Handling of deep-sea prawns - on board ship, on land.

LB

2.0

similar whether or not the system was made anoxic. The change in lactate concentration between death of the fish and the onset of rigor mortis did not show any correlation with the tension developed.

[6 figures, 1 table, 28 references]

FTP

FTP

The author discusses the significance of staphylococci in foods and the preventive measures that might be taken to prevent staphylococcal food poisoning. He believes that the staphylococci problem is just as important as the salmonella problem, and he refers to a recent report issued by the National Academy of Sciences (Washington, D.C.) entitled "Evaluation of Salmonella Problem," Publication No. 1603 (1969).

[2 tables, 33 references]

De Figueiredo, Mario P. (Kitchens of Sara Lee, Deerfield, Illinois)  
Journal of the American Dietetic Association 58, No. 2, 109-114 (February 1971)

STAPHYLOCOCCI CONTROL AND THE FOOD PROCESSOR

2.3  
(0.5)

1.87 (2.15)(2.4)(9.15)

5. Dispose of dead lobsters by incineration if possible. (Disposing of infected lobsters at sea or along the shore helps perpetuate the disease.)

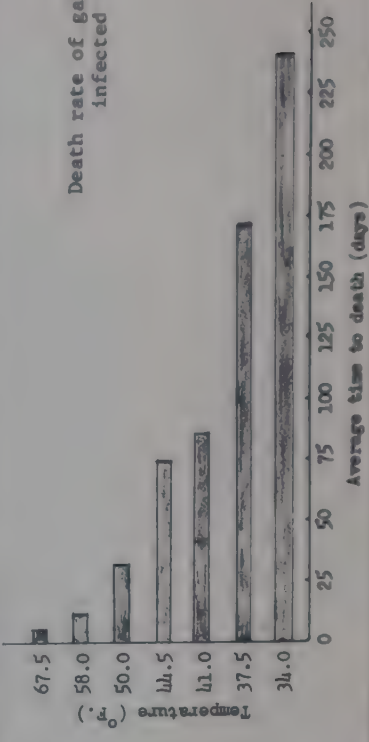
6. Inspect holding tanks frequently, and immediately remove weak lobsters before cannibalism begins.

7. Scrub and disinfect holding tanks regularly--and especially after an outbreak of gaffkemia. (See procedures suggested in New Series Circular No. 42.)

8. Make sure that the water inlet is as far as possible from the wastewater outlet.

9. Keep water temperatures as low as possible--ideally, at 34° F. (See accompanying figure.)

[1 figure]



LB



Walker, P., D. Cann, and J. M. Shewan (Ministry of Technology, Torry Research Station, Aberdeen, Scotland)  
Journal of Food Technology 5, No. 4, 375-385 (December 1970)

'Scampi' (shrimp) are also known as Norway lobster or Dublin Bay prawn. This study was carried out to obtain some information of the factors affecting the keeping quality of scampi after they are landed that would lead to improved handling and storage on ship and shore. Consequently, a study was made of the bacterial flora of fresh scampi and of flora of the scampi stored at ice temperature. Also, sensory evaluations of and chemical analyses for the types and amounts of loss in the fresh and stored scampi were made.

Lots of freshly landed headless scampi were collected at three ports in Scotland. At the laboratory, samples were immediately taken for bacteriological, chemical, and sensory analysis. The remainder of each lot was stored unshelled with or without ice in a chill room at 2.2° C. Samples for analysis were taken after 2, 4, 6, 8, 10, or 12 days of storage (until they were judged inedible by the taste panel). Bacteria counts were made at 20° C. and 37° C. incubation temperatures. The scampi became inedible after 8-10 days of storage due to the presence of strong, ammoniacal, sour odors and flavors. Bacteria counts of the scampi rose sharply after the fourth day of storage, reaching 10<sup>6</sup>/g. of scampi at 20° C. and 10<sup>4</sup>/g. at 37° C. at the end of the storage period. The initial flora consisted mainly of coryneforms, but the flora changed during storage of the scampi until it finally consisted mainly of Achromobacter species (70%).

(over)

DUTCH TWIN BOOM TRAWLING

De Boer, E. J. (Technical Section, Dutch Fisheries Directorate)  
World Fishing 19, No. 11, 38, 40-41, 49 (November 1970)

When Dutch shrimp trawlers began beam trawling for flatfish in the early 1960's, the size and propulsive power of their vessels limited the length of the beams to about 22 ft. But, since the area of seabed fished per unit of time increases as the beam length, or net opening, increases, and the catch per unit of seabed area fished is directly influenced by the weight per unit length of the tickler chains, the dimensions and propulsive power of the vessels have sharply and steadily increased. The current beam length is between 30 and 36 ft., and new vessels are being built with installed engine power ranging from 900 to 1,200 b.hp. Not only would longer beams be unmanageable, but both they and the spreading booms would have to be of very strong, heavy construction to withstand the additional bending and buckling forces such length would impose.

Although gear sizes are no longer increasing, the weight of the tickler chains continues to do so. The effect of these developments can be seen below.

Year trawler built	Engine horsepower	Length of beam ft.	Weight of tickler, each groundrope		Total weight, each beam gear	
			lb.	lb.	lb.	lb.
1967	540	28	1,452		3,784	
1970	900	33	3,388		8,800	

The author describes the rigging of beam gear and the rationale of the variations in its three main components--the trawlheads, the net, and the tickler

(over)

MAINE AGENCY DRAWS PLANS FOR SHRIMP TRAPS

Rinaldo, Ronald G. (Maine Shrimp Research, Sea and Shore Fisheries Laboratory, West Boothbay Harbor, Maine), Paul M. W. Venno (Marine Fisheries Extension Service, Sea and Shore Fisheries, Augusta, Maine), Martin Brewer, Afton Farrin, and Donald Nelson  
National Fisherman 51, No. 10, 16B-17B (February 1971)

Maine fishermen began using traps to catch shrimp during the 1969-1970 season. Because of the interest that has grown in this means of fishing, the authors made a survey of commercially available shrimp traps and developed a set of instructions for the step-by-step construction of two types of the trap. They also give the sources of any materials that may not be available from normal marine suppliers or hardware stores.

The half-round trap is 30 x 24 x 16 inches and can be made with either a single or a double head opening. Materials needed are pot stock for the frame, 16-gauge 1/2-in.-mesh aluminized wire, hog rings (the small wire rings used in hogs' ears or on car-seat upholstery) and special pliers, and ballast. Tools required are hammer, wire snips, and a bending brake or jig. This trap can be made in 2 or 3 hours; it costs about \$6.50.

The square trap is 30 x 24 x 14 inches; it, too, can be made with single or double head opening. Materials needed are 16-gauge 1/2-in.-mesh aluminized wire, hog rings and pliers, aluminum clip rings and special pliers, and two bricks.

Tools required are wire snips, diagonal wire cutters, bending brake or jig, and a (over)

TRIALS WITH A TRANSPONDING ACOUSTIC FISH TAG TRACKED WITH AN ELECTRONIC SECTOR SCANNING SONAR

Walker, M. Greer, R. B. Mitson, and T. Storeton-West (Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, Suffolk, England)  
Nature 229, No. 5281, 196-198 (January 15, 1971)

The article begins with a description of the ARL scanner that has been installed aboard the Ministry of Agriculture's research vessel Clione. Details of the design and of the installation may be found in Ultrasonics 4, No. 1 (1966) and in the Proceedings of the IERE Conference on Electronic Engineering in Ocean Technology, held in Swansea in 1970.

Although both shoals and individual fish have been tracked with the scanner, a more positive means of identification and tracking was needed. Hence the authors developed a transponding system that can be attached to the fish. The system consists of a receiver and a transmitter operating at 300 kHz, the carrier frequency of the scanner. The signal received from the scanner is amplified and used to trigger a transmitter that is part of the fish tag. (The tag is to be described in another publication.) A 3-msec. pulse emitted from the tag returns to the scanner, where it is displayed as a bright triangle.

In a test of the acoustic tag, the authors tagged a 43-cm. plaice (Pleuronectes platessa L.) and released it in the southern part of the North Sea. They followed the fish from 10 a.m. until after midnight, when operator fatigue caused tracking to be halted. During all this time, they could maintain contact for distances of up to 365 m. When the fish was on the bottom, however (the area has

(over)



2.3 SHRIMP PROCESSING

U.S. Patent 3,528,125  
Jones, J. M., Jr.; General Tool Co. (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

The apparatus and method are used to process freshly caught shrimp aboard the fishing vessel. FTP

2.3 SHELLFISH PROCESSING

U.S. Patent 3,528,124  
Westrom, R. T., and T. S. Gorton, Jr. (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

The patent covers a method and the equipment for shucking shellfish (bivalves). FTP

BT [seangif 11] 'sdrat petetdmoq eht jo sswia  
pepoldra pua dret hsee rof silitatp tntednocomdopn eht  
ni apew ad uac dret sith 'ni & uqy esal fo yhidw waf a guivah asia pawaf-jatj  
(58'1) 8211'2

2.5 CONDITIONED WATER-HABITAT FOR SHIPPING AND KEEPING LIVE FISHES  
(2.4) (2.15) (9.16)

Proewig, Frederick W. (Aquarium Import Corp.) (pat.)  
U.S. Patent 3,522,793  
Chemical Abstracts 73, No. 25, 128357w (December 21, 1970)

BT [seangif 21] 'sdrat petetdmoq eht jo sswia  
pepoldra pua dret hsee rof silitatp tntednocomdopn eht  
ni apew ad uac dret sith 'ni & uqy esal fo yhidw waf a guivah asia pawaf-jatj  
(58'1) 8211'2

2.3 INDUSTRIAL WASTES TREATMENT BY ACTIVATED SLUDGE.  
(9.19) XVIII. TREATMENT OF WASTES FROM FISH MEAT MANUFACTURE  
Dazal, M., M. Ogawa, and T. Misono  
Rep. Ferment Res. Inst., No. 34, 11-18 (1968)  
BFMRA 24, No. 1, Abstract No. 231, 48 (January 1971)

Experiments indicated that treatment of wastes from fish processing by activated sludge showed that efficiency of the treatment increased as the sludge became adapted to the waste water. Reprinted

2.3 FISH CUTTING APPARATUS

British Patent 1,197,435  
Johannesson, R. (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

Three coaxially spaced cutting disks are used to cut and eviscerate fish. FTP

BT [seangif 21] 'sdrat petetdmoq eht jo sswia  
pepoldra pua dret hsee rof silitatp tntednocomdopn eht  
ni apew ad uac dret sith 'ni & uqy esal fo yhidw waf a guivah asia pawaf-jatj  
(58'1) 8211'2

2.1112 LEAFLET IS AVAILABLE ON TRICKY JOB OF CUTTING WEB TAPES  
Anonymous  
National Fisherman 51, No. 10, 20B (February 1971)

Captain Geoffrey A. Motte, an assistant professor of fisheries and marine technology at the University of Rhode Island, has authored a leaflet giving commercial fishermen mathematical formulas for making two different types of net taper. The formulas apply to the body cut and the jib cut. They have been printed, the author says, to save fishermen time, material, and temper. The leaflet can be obtained by writing for "Cutting Web Tapers," Marine Advisory Service, 19 Upper College Road, University of Rhode Island, Kingston, R.I. 02881. L

BT [seangif 21] 'sdrat petetdmoq eht jo sswia  
pepoldra pua dret hsee rof silitatp tntednocomdopn eht  
ni apew ad uac dret sith 'ni & uqy esal fo yhidw waf a guivah asia pawaf-jatj  
(58'1) 8211'2



U.S. Patent 3,525,120  
Jobmann, P.; Nordischer Maschinenbau Rud (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

Fish fillets are produced that are free of pin bones. The fish is cut open and the belly flaps are severed from the back.

2.3 FISH CLEANING APPARATUS

U.S. Patent 3,525,121  
Elich, A.; Ralston Purina (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

The apparatus removes the head and viscera of fish.

FTP  
The apparatus is used to remove the head and viscera of fish. The fish are placed in a container and the apparatus is used to remove the head and viscera. The fish are then cut into fillets.

2.3 FISH COOKING

3.15 EFFECT OF  $\gamma$ -IRRADIATION ON BEEF MYOGLOBIN

Clarke, Reginald, and James F. Richards (Department of Food Science, University of British Columbia, Vancouver 8, B.C., Canada)  
Journal of Agricultural and Food Chemistry 19, No. 1, 170-174 (January-February 1971)

The myoglobins are the heme-containing pigments responsible for the red color in meats. Earlier work has shown that the heme, as well as the protein moiety, of meat is affected by irradiation. The stability of the pigments responsible for color is an important consideration in the irradiation preservation of meats, at least for esthetic reasons. This study was carried out to determine the effect of irradiation on the myoglobins of beef.

Samples of metmyoglobin, myoglobin, or a mixture of oxy- and metmyoglobin in an oxygen or nitrogen atmosphere were  $\gamma$ -irradiated at 1 Mrad. The absorption spectra of these samples suggested that the iron was in the Fe<sup>3+</sup> form but the normal metmyoglobin structure was destroyed. As the irradiation dose increased from 0 to 6 Mrad, the Soret absorbance of hemein and, to a lesser extent, myoglobin underwent a progressive decrease. Treatment of myoglobin with H<sub>2</sub>S and  $\gamma$ -radiation singly and in combination provided evidence (spectral) that sulfinyoglobin per se cannot account for the absorption spectrum of irradiated myoglobin.

The fluorescent spectra of irradiated hemein and irradiated myoglobin that were not similar to that of protoporphyrin may be due, the authors suggest, to the presence of a chole-heme protein formed by rupture of the hemein nucleus.  
[7 figures, 1 table, 15 references]

FTP

NEW WAY TO FABRICATE MEATS

Fenters, W. (Purveyors Meat Supply, Inc., Pennville, Indiana), and John V. Ziemba (Food Engineering, Chicago, Illinois)  
Food Engineering 43, No. 1, 64-65 (January 1971)

With the technique described here, boneless meat, poultry, or fish is cut into flakes about the size and thickness of a fingernail. The flakes are then knit together in a blender, frozen, tempered, and machine-pressed into loaves. Subsequent slicing, dicing, or cutting into strips governs the ingredients added during blending: spices, seasonings, flavor potentiators, proteins, fats, textured soy protein, or meat cuts. The resulting product can be formed into a variety of shapes, and it can be tailored for texture, tenderness, and fat and protein level. The re-formed, portion-controlled meat will retain its shape during cooking--even the diced product will not fall apart when used in stews or casseroles.

The key component in the flaking process is a centrifugal cutter having a stationary cutting head and a high-speed, 3,600 r.p.m. impeller. The cutting head contains columns of precision-honed, vertical knives and uniformly spaced, thin, horizontal bars. The number of knives and the spacing of the bars determine the size and shape of the flaked product. The process works as follows: a screw conveyor feeds boneless meat from a hopper into the center of the cutter's revolving impeller; the meat is accelerated to high speed, impelled by centrifugal force into the cutting head, and then ejected. During flaking, heat rise and loss of juice are minimum. [3 photographs]

LB

3.2349 FROZEN FISH FILLETS

British Patent 1,198,748  
Frisnor Norsk Frossenfish A/L (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

A vacuum processing method is used to produce frozen fish fillet blocks relatively free of voids.

FTP

3.2349 JELLIED FISH PRODUCT

Japanese Patent 17133/70  
Nippon Suisan KK. (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

Raw fish materials are bleached at pH 5; then they are dehydrated and frozen.

FTP

Amino acids and sorbitol are added to the water-bleached, finely divided fish meat. The material is then frozen and stored.

FTP

Food Technology 25, No. 1, 56 (January 1971)

Japanese Patent 17575/70

Taiyo Fishery Co. (pat.)

(3.12)

FISH PRESERVATION







3.2495 STUDIES ON THE CONTROL OF THE DENATURATION  
(3.12)(6.54) OF THE FISH MUSCLE PROTEINS DURING THE FROZEN STORAGE.  
I. PREVENTIVE EFFECT OF Na-GLUTAMATE

Noguchi, Satoshi, and Juichiro J. Matsumoto (Department of Chemistry, Sophia University, Chiyoda-ku, Tokyo, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 10, 1078-1087 (October 1970)

To obtain information about the denaturation mechanism of fish muscle as a consequence of the interaction of proteins with other substances and to discover some new materials that will prevent denaturation during frozen storage, the authors tested the denaturation, in the presence of a variety of additives, of frozen carp actomyosin. They report the results of in vitro model tests in which they studied the effect of Na-glutamate on the denaturation of isolated actomyosin and of tests on the Na-glutamate effect on the quality of kamaboko jelly. Since the jelly-forming ability of a material is a good index of the state of the material's actomyosin molecules (a major factor in the texture of meats), they theorized that the results of their tests on the quality of kamaboko jelly should be applicable to the quality of other frozen-stored meats and meat products.

Carp actomyosin was either dissolved in 0.6 M KCl solution or suspended in 0.05 M KCl. The tests in 0.05 M KCl served as the model for the frozen-stored meat and the salt-free minced meat (the basic ingredient of kamaboko), and the 0.06 M KCl served as the model for the salted minced meat. Minced, washed, fresh horse mackerel (*Trachurus japonicus*) was used for the tests on kamaboko jelly.

To the actomyosin dissolved in 0.6 M KCl and to that suspended in 0.05 M KCl, either 0.3 M Na-glutamate, 1.0 M glucose, or 0.05 M urea was added. In the model (over)

3.3344 A CAUSE AND MECHANISM OF BLUE DISCOLORATION OF CANNED CRAB MEAT.  
(7.592)

Inoue, Norio, and Terushige Motohiro (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 9, 945-948 and No. 10, 1040-1047 (September and October 1970)

IV. SPECTROPHOTOMETRIC STUDY OF BLUE MEAT, pp. 945-948.

In an earlier paper, the authors reported that crab hemocyanin would turn dark green when heated with hydrogen sulfide. They speculated that the reflectance spectrum of the compound so formed and that of the blue meat of unacceptably canned crab might be similar. Here they report the results of a spectrophotometric study of blue and normal meats of canned king crab (*Paralithodes camtschatica*) and the reaction between the crab's hemocyanin and hydrogen sulfide.

Maximum reflectance in the blue meat appeared at 550-570 mμ. If the color intensity was slight, maximum reflectance at 550 mμ was not evident; however, the percentage reflectance decreased as the intensity deepened. Maximum reflectance in the hemocyanin-sulfide complex appeared at 530-550 mμ; it did not appear in heat-coagulated hemocyanin. The relation between color intensity and the content of copper combined with sulfide was linear. The authors suggest that the analysis of percentage reflectance of the blue meat offers good possibilities for the color assessment of the bluing. [6 figures, 3 references]

V. ISOLATION OF CAUSATIVE SUBSTANCE OF BLUE MEAT, pp. 1040-1043.

Although the previous study showed that hemocyanin and hydrogen sulfide are involved in the blue discoloration of canned crab, it did not isolate the causative substance or reveal the chemical composition of the blue substance. (over)

3.335 PROCESSING LOSS IN ROLLED MEAT PRODUCTS

Linke, H.  
Fleischwirtschaft 49, 1469 (1969)  
Food Manufacture 45, No. 10, 96 (October 1970)

To a great extent, preheating conditions determine the amount of weight lost from canned meat roulades. Losses from individual roulades during frying may vary appreciably, since under practical conditions they are not heated evenly, but the average loss is about 28%. When fat content is high, of course, weight loss is greater. Total heat loss, including that by frying and sterilization, averages about 37½ 8%. Large-scale manufacture or small-scale does not affect these percentages significantly, nor do differences in the connective tissue of the meat. Technological influences on the relation between frying and sterilization losses are slight; low frying losses result in high sterilization losses, and conversely.

LB

3.4 LIQUID SMOKES FOR USE IN CURED MEATS

Gorbatov, V. M., N. N. Krylova, V. P. Volovinskaya, Yu. N. Lyaskovskaya, K. I. Bazarova, R. I. Khlamova, and G. Ya. Yakovleva (All-Union Research Institute of the Meat Industry, Moscow, U.S.S.R.)  
Food Technology 25, No. 1, 71-77 (January 1971)

The researchers made comparisons of the chemical composition and quality of nine commercial liquid smoke preparations from different parts of the world. Liquid smokes are prepared from the condensation products of the pyrolysis of wood. The authors found that the composition of the liquid smoke preparations did vary with the method of preparation, the quality of the smoke condensate, and the amount of purification of the condensate. They suggest that the commercial use of liquid smoke preparations in cured meats will require additional research and development work. The first table that follows shows the effect of moisture content of wood sawdust on the composition and quality of the liquid smoke; the second gives data on the analysis of commercial smoke preparations.

Moisture content of the wood sawdust %	Yield per 100 g. of sawdust			Formaldehyde	Organoleptic quality
	Condensate	Phenols	Acids		
1.8	28.2	236	3,293	mg. 122	Unsatisfactory
21.5	41.5	136	3,288	81	Good
24.5	43.5	100	3,003	78	Good
31.2	32.8	33	890	--	Almost satisfactory

(over)



[1 figure, 2 tables, 7 references]

## As early as 195

In heparin-coagulated hemocyanin, half the copper was cuprous, and half was cupric. Under reducing conditions, most of the copper was cuprous. Since no cuprous copper was detectable when such chelating agents as EDTA were added, the lability of the copper apparently depends on the reduction or oxidation of the solution. In the hemocyanin-sulfide complex, the content of the copper and of the copper-bound sulfide was  $17.6 \times 10^{-3}$  and  $8.7 \times 10^{-3} \mu\text{M/mg.}$ , respectively.

The quality of kamaboko jelly was judged in terms of gel strength, expressible water, soluble protein (protein concentration of the supernatant being determined by the biuret method described by Umemoto in 1966), and durability (the ability of a disk 3 cm. in diameter and 5 mm. thick to withstand being folded once to a semicircle or twice into a quadrant without cracking or breaking). The kamaboko made from meat to which Na-glutamate had been added had a higher quality than did the control. Results of tests on the two types of product, made from minced horse mackerel and stored for 6 weeks at  $-20^{\circ}\text{C}$ , are given below.

By weight of wet minced meat. \*\*A-no cracks when folded into quadrant; B-slight cracks when folded into semi-circle.

[6 figures, 1 table, 24 references]

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3.27  
(0.12)

Ed Wld 5, No. 10, 22-23 (1970)  
BFMRA 24, No. 1, Abstract No.

The thawing plant consists of a warming chamber, where steam forms at low temperature, no cooking and minimal loss of weight.

## 3.27

REFROZEN STORAGE QUALITY OF FISH  
(3.239)(1.51)  
(1.69)(1.4)

MacCallum, Wallace A., and D. R. Idler (Technol. Unit  
St. John's, Newfoundland)  
Chemical Abstracts 74, No. 1, 2789r (January 4, 1971)

The theory of using high-frequency heat to thaw deep-frozen meat is discussed and illustrated with practical examples. Operational conditions and effects are shown in tables and graphs, and the method of calculating processing costs is given. Advantages of the process, including advantages of using microwaves to thaw minced meat, are particularly evident in the flexibility it allows in production and marketing and the high quality of the product it yields.

Industr. alim. agr. 86, 1251 (1969)  
Food Manufacture 45, No. 10, 97 (October 1970)

3.27

3.2495  
(1.51)

Love, R. Malcolm (Torry Res. Sta., Mtn. Technol., Aberdeen Chemical Abstracts 73, No. 25, 129656e (December 21, 1970))

411

	2.4	18.1	17.4	0.7	2.3	45.0	mmol. / 100 ml.	17.2	15.3	2.3
Japan	1.5	1.4	1.1	0.3	0.6	4.8		4.6	2.1	0.47
France	0.8	5.3	5.2	0.1	2.2	4.1		6.9	1.0	0.4
France	3.4	11.4	4.7	6.7	1.1	53.7		59.5	2.0	0.16
Hungary	30.0	7.8	7.8	0	0.6	1.6		1.5	3.2	13.6
Poland	2.1	16.8	11.2	5.6	0.5	100.0		8.1	4.9	3.5
Canada	1.2	5.5	5.3	0.2	2.1	16.7		3.8	4.1	0.02
U.S.S.R.	2.2	10.5	6.0	4.5	0.5	45.0		44.6	1.6	1.4
U.S.S.R.	9.4	4.6	1.2	3.4	0	23.3		0.8	0	15.2

[illegible]



3.4 DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS  
IN LIQUID SMOKE FLAVORS

White, Richard H., John W. Howard, and Charles J. Barnes (Division of Food Chemistry and Technology, Food and Drug Administration, Washington, D.C. 20204)  
Journal of Agricultural and Food Chemistry 19, No. 1, 143-146 (January-February 1971)

Interest in the analysis of liquid smoke flavors has been stimulated by the earlier demonstration of the presence of the carcinogen benzo[*a*]pyrene and of other polycyclic hydrocarbons in smoked foods. The purpose of the present study was to develop analytical methods for the determination of polycyclic aromatic hydrocarbons in water-soluble smoke flavors and to determine the incidence of such compounds in the various liquid products now available commercially. In addition, analysis was made of the polycyclic aromatic hydrocarbon content of the resinous condensates that settle out on storage of the liquid smoke flavors.

The hydrocarbons in liquid smoke flavors and resinous condensate were isolated by liquid-liquid partition and thin-layer chromatography, and measured by ultraviolet and spectrophotofluorometric techniques. Data on the polycyclic aromatic hydrocarbon content of liquid smoke flavor samples are shown in the table that follows.

(over)

3.5 DRY SALTED FISH PRODUCT  
(3.2342)

Japanese Patent 18942/70  
Nakamura, T. (pat.)  
Food Technology 25, No. 1, 56 (January 1971)

The fish are frozen in brine at -20° C., then dried in moving moisture-free air at a temperature lower than 0° C.

Seasoning compositions are prepared by mixing suspensions of red and yellow pigments, salt, and fish-derived amino acids.

Food Technology 22, No. 1, 66 (January 1971)

3.9 FISH-DERIVED SEASONING

Japanese Patent 19629/70  
Tomijima, N. (pat.)

7.9 CHARACTERIZATION OF OIL SLICKS ON SURFACE WATERS  
(9.19)

Kawahara, Fred K., and Dwight G. Ballinger (Analytical Quality Control Laboratory, Federal Water Quality Administration, Cincinnati, Ohio 45202)  
Industrial & Engineering Chemistry Product Research and Development 2, No. 4, 553-558 (December 1970)

Because the oil spills that do so much damage to the environment often occur unwittingly, some means of identifying the source of the spill is necessary to control the resulting pollution and establish responsibility for it. This report extends the identification procedure developed by Johnson et al. in 1968 and Kawahara in 1969 to characterize heavy oils and asphalts. It illustrates use of the method by characterizing numerous oil spills of unknown character (the oil samples being collected from the inland and coastal waters of the United States), and it corroborates the findings with data provided by classical test methods.

Using two key ratios, 810 cm<sup>-1</sup>/1375 cm<sup>-1</sup> and 810 cm<sup>-1</sup>/720 cm<sup>-1</sup>, the authors analyzed the oil-spill samples by the method of ratios of infrared absorbance (RIA), using six wave numbers. They then confirmed the initial results by using four other ratios. Ratio values determined for the unidentified petroleum pollutants were compared with values determined for 41 commercial products (20 asphalt samples and 21 heavy residual oils) manufactured by 7 petroleum companies. To confirm the RIA findings further, the authors also examined the oils' infrared spectra; their solubility in hexane, ether, and chloroform; their specific gravity; and their metal content. They suggest that use of this method of characterization can save from 30 to 50% of search time, since it eliminates a large number of petroleum products from further consideration. [5 figures, 5 tables, 4 references]

4.5 EFFECTS OF MODEL SYSTEM COMPOSITION ON AUTOXIDATION  
OF METHYL LINOLEATE

Heidelbaugh, Norman D., Cheng P. Yeh, and Marcus Karel (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Mass. 02139)  
Journal of Agricultural and Food Chemistry 19, No. 1, 140-142 (January-February 1971)

When foods contain significant amounts of metal catalysts, small amounts of water can be antioxidant by hydrating the catalysts (thus reducing their activity). For example, small increases in the water content of dehydrated foods may retard oxidative deterioration. However, water may also promote oxidation in foods, particularly in situations where the water content is high. Walnuts and beans tend to oxidize faster at very low and at very high moisture contents as compared to moisture levels in between these extremes. In the present study, the authors determined the effect of system composition on oxidation at various water activities [water activity (*a<sub>w</sub>*) is defined as the ratio of partial pressure of water in food to the vapor pressure of pure water at the given temperature]. Such information is useful for the selection of optimum water contents in foods to retard lipid oxidation, especially for intermediate-moisture foods whose water content may be in the range in which the water changes from a predominantly antioxidant component to a prooxidant.

The researchers studied the autoxidation of methyl linoleate in model systems containing added cobalt nitrate and water-binding agents (cellulose, dextran, and glycerol). The water activity levels selected ranged from 0.11 to 0.96. Oxygen absorption of the samples at each water activity at 37° C. was followed with standard Warburg manometric techniques.

(over)



Hamada, Iwao, and Masami Hayashi  
Journal of Faculty of Fisheries Prefectural University of Mie 8, No. 1, 63-72  
(December 20, 1969) (In Japanese; figures, tables, and résumé in English)

The technique of gas chromatographic analysis of fatty-acid methyl esters is examined, and selected chromatographic conditions are discussed. The fatty-acid constituents of sesame oil, soybean oil and lecithin, egg-yolk lecithin, olive oil, beef tallow, and lard were determined. The last four of these lipids contained hexadecenoic acid and heptadecenoic acid also. When soybean oil was heated, its unsaturated fatty-acid constituents decrease as the degree of heating increases. Tetradecanoic and pentadecanoic acid constituents decrease as the degree of heating increases. BT

[11 figures, 1 table, references]

The fat content of fresh and fried fish and blanched and fried chips is tabulated. Detailed tables are given of the quality of fats and oils of various types before and after frying fish or chips.  
Reprinted

4.11 (2.8) EVALUATION AND ANALYSIS OF FRYING FATS. II.

Mankel, A.  
Fette Seifen Anstrichmittel 72, No. 8, 677-688 (1970) (In German)  
BFMIRA 23, No. 12, Abstract No. 2708, 647 (December 1970)

Polycyclic aromatic hydrocarbon content in condensate	Benzene				Phenanthrene				Fluoranthene				Triphenylene				4-Methylbenz[a]pyrene			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
smoke	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
flavor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
oil	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

BT  
Benzene (C<sub>6</sub>H<sub>6</sub>) was found in the resinous condensate in amounts ranging from 0.008 to 0.025 mg/g (that settled out of the liquid smoke during storage) (11 figures, 1 table, references)

3.4 SMOKE FLAVOR COMPOSITIONS  
German Patent 1,692,227  
Vsesoyuznyi Nauchno-Issledovatel'skii Inst. Mysnoy Promyshlennosti (pat.)  
Food Technology 25, No. 1, 66 (January 1971)  
The smoke flavor compositions consist of wood distillate fractions that have been subjected to adsorption and desorption.  
FTP

In all the systems tested, water is antioxidant up to a critical water activity level, above which increases in water content promote oxidation. The critical water content and the critical water activity depended upon the composition of the model system. Cobalt and glycerol decreased the numerical value of the critical water content and of water activity; dextran increased the critical water content. The authors explained the results as follows: a small amount of water is bound to the polysaccharides and does not affect oxidation. Additional amounts of water are antioxidant because of the hydration of the catalysts and of the hydroperoxides. At high contents of water, the antioxidant effects are overshadowed by the ability of water to solubilize the metallic prooxidants (thus to mobilize them). [11 figures, 1 table, 11 references]

FTP

[1 figure, 7 references]

The researchers undertook this study in order to evaluate the use of mass spectrometry for identifying individual glyceryl ether diesters and for determining the position of the ether group on the glycerol molecule. For this purpose, they synthesized the two positional isomers of both pentyl dihexanoate and hexyl dihexanoate and studied their mass spectra.

Letellier, Paul R., and Massey W. Nayar (Department of Food Science and Technology, University of Massachusetts, Amherst, Mass. 01002)  
Journal of Agricultural and Food Chemistry 19, No. 1, 196-197 (January-February 1971)

4.2 (3.15) MASS SPECTROMETRY OF GLYCERYL ETHER DIESTERS

Jewell, G. G., and M. L. Meara (British Food Manufacturing Industries Research Association, Randalls Road, Leatherhead, Surrey, England)  
Journal of the American Oil Chemists' Society 47, No. 12, 858-865 (December 1970)

Information to date on the crystalline structure of fats has been based on the use of light microscopic and X-ray diffraction techniques. But, these methods do not cover the entire range of sizes of crystals because the light microscope enables measurements of crystals down to a value of 1  $\mu$  and the X-ray technique gives information on unit cells and repeating units in nanometers. The electron microscope (having a resolution limit of about 0.5 nm.) offers the possibility of direct visual observations of crystals in sizes precisely in the range of 1 nm. to  $> 0.1 \mu$  (the light microscopic and X-ray techniques cannot span this range). The authors developed a replica technique to study the crystalline structure of fats using the electron microscope.

A replica prepared by the vacuum deposition of a layer of carbon onto the surface of the specimen. A contrasting agent (platinum) is vacuum deposited on the carbon non layer from a precisely known angle (called shadowing). The substrate is removed from the replica by stripping or by solvent extraction and the replica is examined in the electron microscope. In this study the fats were frozen prior to replicating; the fat was removed from the replica by solvent extraction. Authors found that freezing fats at different rates produced structural differences within the fat. They are now studying the differences in crystal habit exhibited by a wide variety of fats to determine the relationships between these parameters and the performance characteristics of the fats.

[11 figures, 10 references]



(0.4)  
Comfort, A., I. Youhtsky-Gore, and K. Pathmanathan (MRC Group on Ageing, Department of Zoology, University College, London WC1, England)  
Nature 229, No. 5282, 254-255 (January 22, 1971)

Several workers have found that mice fed diets containing large amounts of  $\alpha$ -tocopherol, 2-mercaptoethylamine, ethoxyquin, tert-butyl hydroxytoluene, dithiocarbamates, or nor-dihydroguaiaretic acid live longer than mice fed standard laboratory diets. In the life-span effects reported here, C3H mice (a strain reportedly unaffected by antioxidants) fed a standard pelleted diet moistened and reconstituted with 0.5% w/w ethoxyquin oil grew into significantly lighter adults, lost weight earlier, lived longer, and showed strikingly better activity and condition with age than did control mice fed an identical diet without the antioxidant. Such nonactuarial indices of ageing as pigment deposition and tumor incidence will be reported later.

The authors note that the increased longevity of the mice fed ethoxyquin is compatible with the hypothesis (Harman, 1956; Tappel, 1968; and Dormandy, 1969) that both natural and radiation-induced ageing may involve oxidative free radical attack on long-term molecules or on lipids. However, they suggest that other explanations are equally likely: the large amounts of chemicals may have spoiled the appetite of the mice or hindered food assimilation, causing the effect to be a result of covert calorie restriction; the excess antioxidant may have reduced the toxicity of the normal laboratory diet; the hepatic enzyme concentrations attributable to the ethoxyquin diet, a possible enzyme inducer, may have increased the mice's life expectancy; or straightforward chemical stress may have caused the longer gross survival. [1 figure, 2 tables, 18 references] LB

Purr, A.  
Fette-Seifen-Anstrichmittel 72, 725 (1970)  
Food Manufacture 45, No. 12, 60 (December 1970)

During a study of the chemical changes that occur in low-moisture foodstuffs, the author constructed models of lipoygenase and mixtures of enzymatically active systems. He tested the models to show their effect on the autoxidative deterioration of fats in dry products as a function of equilibrium moisture content. Since enzymatic lipolysis and lipoperoxidation and the subsequent formation of rancid products occur at equilibrium moisture content, they are independent of mobile water. Oxidation degrades the free, polyunsaturated fatty acids more than it does the glycerides. Using soya lecithin as the medium, the author found that phospholipase A and B and lipoygenase gave results analogous to those of phospholipids. Horseradish peroxidase accelerated the decomposition of fatty hydroperoxides and hastened the formation of carbonylic deterioration products. When the above enzymes are all present in dry foodstuffs containing fats, the carbonyl compounds will form at low water levels. Addition of NADH-alcohol-dehydrogenase, however, will reduce the aldehydes to alcohols and improve the flavor of the foodstuff. LB

Rylander, Paul N. (Engelhard Industries, Newark, New Jersey 07105)  
Journal of the American Oil Chemists' Society 47, No. 12, 482-486 (December 1970)

This article is one of ten published from the Symposium "Hydrogenation" conducted by the American Oil Chemists' Society in New Orleans, La., on April 26-30, 1970. It discusses the noble metal (ruthenium, rhodium, palladium, osmium, iridium, platinum) catalysts as a group, points out similarities and differences among the metals relevant to the hydrogenation of natural oils, and describes some of the practical applications of catalysis by palladium.

From the economic standpoint, commercial applications of noble metal catalysts would be limited to palladium or to palladium admixed with small amounts of other noble metals as promoters. Palladium and ruthenium are comparable in price; the other noble metals are more costly. Palladium is the most active of the metals. [The absolute, or even relative, activity of the catalysts depends upon the support, method of preparation, substrate, impurities, and substrate condition. Nonetheless, a general sequence for activity for olefin saturation is Pd > Rh > Pt >> Ir > Ru >> Os.] Palladium is anywhere from 30 to 100 times more active than nickel in hydrogenation of oils.

Two major technical problems are connected with processing over palladium catalysts: (1) maintenance of a sufficiently clean system and (2) control of trans isomers in partially hydrogenated oils. Because palladium is so exceedingly active, only small amounts are needed, but the catalyst becomes sensitive to poisons. Also, hydrogenations over palladium catalysts tend to produce relatively (over)

HYDROGENATION OF UNSATURATED FATTY ESTERS WITH COPPER-CHROMITE CATALYST: KINETICS, MECHANISM AND ISOMERIZATION

Koritala, Sambasivarao (Northern Regional Research Laboratory, Peoria, Illinois 61604)  
Journal of the American Oil Chemists' Society 47, No. 12, 463-466 (December 1970)

This article is one of ten published from the Symposium "Hydrogenation" conducted by the American Oil Chemists' Society in New Orleans, La., on April 26-30, 1970. The author reviews some of the work at his laboratory on the mechanism of hydrogenation with copper chromite and explains the reactions of unsaturated fatty esters with copper chromite based on conjugation of double bonds before hydrogenation.

Hydrogenation of linolenate with copper chromite catalyst produced a large amount of conjugated diene and minor amounts of nonconjugatable dienes. The double bonds in the conjugated dienes and the monoenes were scrambled along the chain; the author explained such distribution of product based on the assumption that hydrogenation followed the conjugation of the double bonds. Fatty esters with conjugated double bonds were reduced preferentially over fatty esters with methylene-interrupted double bonds (under conditions of competitive hydrogenation). Geometric and positional isomerization of conjugated double bonds occurred more rapidly than reduction. When reduction of the conjugated double bonds was carried out in the presence of deuterium, the majority of the resulting products contained no deuterium; most of the added deuterium was incorporated into the unreacted material. [4 figures, 3 tables, 26 references] FTP



Kirschner, E., and E. R. Lowrey (The Procter & Gamble Co., 6000 Center Hill Road, Cincinnati, Ohio 45224)  
Journal of the American Oil Chemists' Society 47, No. 12, 467-469 (December 1970)

This article is one of ten published from the Symposium "Hydrogenation" conducted by the American Oil Chemists' Society in New Orleans, La., on April 26-30, 1970. In this paper, the authors describe the effect of varying the pressure, temperature, and catalyst concentration on the distribution of isomers (geometric and positional) formed during hydrogenation of triolein with a copper catalyst (copper chromite promoted with manganese).

The trillinolein was prepared by esterification of glycerol with linoleic acid (obtained by solvent fractionation of esters of safflower fatty acids); the triglyceride was further purified by solvent fractionation. The fatty-acid composition of the trillinolein was 0.3% C<sub>16:0</sub>, 1.3% C<sub>18:1</sub>, 97.6% C<sub>18:2</sub>, and 0.2% C<sub>18:3</sub>. Two levels of pressure (50 p.s.i.g., 100 p.s.i.g.), temperature (340° F., 392° F.), and catalyst concentration (1%, 2% by weight) were used. The trillinolein was hydrogenated in a stainless-steel batch reactor that was fitted with baffles and agitator, and inlet through which hydrogen could be continuously passed.

Change in temperature levels produced modest effects on diene isomer distributions; pressure and catalyst concentration had little or no effect. The distribution of monoene isomers does not appear to vary during the hydrogenation, and variations of reaction conditions appear to have little effect on the distributions (within the range of variables studied).

[4 figures, 1 table, 21 references]

6.138 (4.22)

large amounts of trans isomers, but the amount produced can be controlled by processing conditions. So far, palladium has not been adapted for commercial scale partial hydrogenations of natural oils, because the amount needed is very small and plant equipment must be altered or designed to handle filtration and recovery of small amounts of catalysts.

[5 tables, 39 references]

Abe, Toshiko, and Yukio Iakhashi (Fac. Eng. Kelo Univ., Tokyo, Japan) Chemical Abstracts 72, No. 14, 68486e (April 6, 1970)

4.21 ANTIOXIDATIVE EFFECT OF KOLIC ACID DERIVATIVES.  
(4.64) I. ALKYL- AND O-ACYLKOLIC ACIDS

Cirilli, Giovanni, and Mauro Sandri (Bologna, Italy)  
Chemical Abstracts 73, No. 1, 2823b (July 6, 1970)

4.21      PEROXIDES. 1. OXIDATION, DECARBOXYLATION, AND RANCIDITY  
(7,594)(6,139)

## GRATS AND OILS - DISTILLATIVE DEACIDIFICATION

Liebling, H. A.  
Fette-Seifen-Anstrichmittel 72, 640 (1970)  
Food Manufacture 45, No. 12, 60 (December 1970)

Following a discussion of the general principles of steam distillation, the author describes a method, with diagrams, for calculating the amount of stripping steam consumed during the distillative deacidification of various types of fats and oils. Using palm, coconut, peanut, and rapeseed oils as examples, he shows how the consumption of stripping steam can be kept to a minimum. The operation of a plant for continuous distillative deacidification and deodorization is described with illustrations, and the fatty-acid composition of important vegetable, animal, and marine oils and animal and marine fat acids tabulated.

LE

Schiller, Klaete, and Edgar Schulz (Inst. Tierernähr., Forschungsanst. Landwirt.  
Brunswick-Voelkenrode, Germany)  
Chemical Abstracts 73, No. 25, 128438y (December 21, 1970)

6.190 EFFECT OF FISH SPECIES AND PRODUCTION PROCESS  
(6.139) ON THE INGREDIENTS AND QUALITY OF FISH MEALS

### 5.5 EFFECT OF FREEZING ON OXIDATION OF L-ASCORBIC ACID

Thompson, Lillian Umale, and Owen Fennema (Department of Food Science, University of Wisconsin, Madison, Wisconsin 53706)  
*Journal of Agricultural and Food Chemistry* **19**, No. 1, 121-124 (January-February 1971)

Earlier studies by various investigators showed that freezing affects the stability of L-ascorbic acid differently from that in dilute simple solutions. L-ascorbic acid is generally more stable in frozen foods than in unfrozen foods. N. H. Grant, and M. E. Alburn [Science 150, 1589 (1965)] found that L-ascorbic acid was less stable (the rate of oxidation was greater) at  $-11^{\circ}\text{C}$ . in solutions containing  $10^{-4}$  M L-ascorbic acid and 0.02 M acetate buffer at pH values of 5.0 and 5.5 than at  $+1^{\circ}\text{C}$ . in the same solutions and at the same pH values. In the present study, the researchers determined the rate of oxidation of L-ascorbic acid in acetate buffer solutions at pH values of 4.6 and 5.5, at various L-ascorbic acid concentrations, and at temperatures ranging from  $+21^{\circ}\text{C}$ . to  $-23^{\circ}\text{C}$ . The samples containing  $1.7\text{ mg}$  L-ascorbic acid in 0.0087 M acetate buffer

samples containing 40 mg of L-ascorbic acid in 0.0007 M acetate buffer dilute solutions capable of dissolving substantial quantities of oxygen) and those samples which had pH values of 5.5 showed upon freezing either an increased rate of oxidation of L-ascorbic acid or a smaller than expected decrease in rate. Samples having a higher concentration of L-ascorbic acid and buffer (40 mg. of L-ascorbic acid per 100 ml. and 0.02 M acetate buffer; and 2,000 mg. of L-ascorbic acid per 100 ml. and 1.0 M acetate buffer) and a pH value of 4.6 (conditions common to many foods) freezing caused expected decreases in the rate of oxidation of L-ascorbic acid. [2 figures, 2 tables 22 references]



6.195 NUTRITIONAL REPORT FROM THE 14TH WORLD'S POULTRY CONGRESS.  
PART II. CHICK NUTRITION AND THE EVALUATION  
OF VARIOUS FEED INGREDIENTS

Couch, J. R. (Department of Poultry Science, Texas A & M University, College Station, Texas)  
Feedstuffs 43, No. 5, 14-16 (January 30, 1971)

In Part I of this report, Dr. Couch summarized papers (presented at the 14th World's Poultry Congress, held in Madrid, Spain, in 1970) that dealt with nutrition of laying hens and broilers. In this second, and last, part, he summarizes papers that dealt with chick and turkey nutrition, turkey management, and the value of various feed ingredients. A paper on protein sources in the U.A.R. is summarized below.

In a rather extensive series of experiments, the animal production department at Ain Shams University incorporated protein concentrates (including fish meal, sardine meal, meat meal, blood meal, cottonseed meal, sesame meal, and horse beans) into semipurified, isocaloric, and complete chick diets at a level to provide 16.14 and 12% protein. The tests lasted 4 weeks. Sardine meal was best in protein efficiency; fish meal was second best. Cottonseed meal was best of the plant proteins, followed in order by sesame meal and horse beans. Meat meal and blood meal were low in protein efficiency, possibly due to unfavorable processing conditions.

LB

COMMERCIAL FISHERIES ABSTRACTS VOL 24 NO 4 PAGE 23

6.52 EFFECT OF PROTEIN AND FAT LEVELS IN COMPLETE PELLETED DIETS  
ON THE GROWTH OF MINK KITS

Kumeno, F., K. Itoyama, J. Hasegawa, and S. Aoki (Nippon Formula Feed Manufacturing Co., Yokohama, Japan)  
Journal of Animal Science 31, No. 5, 894-899 (November 1970)  
S. H. Morrison (reviewer)  
Feedstuffs 43, No. 5, 30, 37 (January 30, 1971)

As a rule, mink ranchers feed diets consisting of 70 or 80% of fresh or frozen meat (thawed), poultry, fish byproducts, or whole fish. Only 20 or 30% is commercial dry mink feed. In the experiments reviewed here, nine groups of pastel mink kits (10 kits to a group) were fed free choice exclusively on dry pelleted diets from age 2 months (on June 23) to pelting (on December 10). A control group of 10 kits was hand-fed a normal wet diet once or twice a day in the conventional manner.

The diets were made of finely ground mixed ingredients formed into 3/16-in. pellets, supplemented with stabilizing extra fancy tallow till the fat content was between 15 and 24%, and coated with pelleting fines to prevent sticking. The experimental feeding was conducted in three phases: (1) the effects of three levels of protein and fat, in a 3 x 3 factorial arrangement, were compared for 1 month; (2) the slowly responding kits on the low-protein diets were transferred to the MH diet (see note below tables on back of card); (3) these slow-growing kits were removed from the experiment.

The results show that the 25% protein requirement set forth in Nutrient Requirements of Mink and Foxes (NRC-NAS Publ. 1676, 1968) is inadequate for this type of diet. Other results are summarized in the tables on the back.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL 24 NO 4 PAGE 23

6.54 MANUFACTURE OF FRANKFURTER-TYPE SAUSAGES  
(3.336)

Kotter, L., et al.  
Fleischwirtschaft 49, 1623 (1969)  
Food Manufacture 45, No. 10, 97 (October 1970)

The chemical processes, and the effects of various additives upon them, that ensue during the manufacture of frankfurter-type sausages are discussed. Dissolved fibrillar muscle protein is a prime factor in the formation of structure, the sliceability, and the binding of the coarse ingredients in sausage. The amount of added solvent, the presence of actomyosin-dissociated substances, the pH and the degree of comminution of the meat, and the temperature during mincing are all important in the dissolution of the protein. Since optimum activation of fibrillar muscle protein in sausages that are to be heated is not always possible, substances to facilitate chopping, water binding, fat emulsification, and structure formation are often added.

Under practical manufacturing conditions, the authors compared the effect on frankfurter quality of added soya protein, hydrolyzed milk protein, dried blood plasma, or diphosphates. They determined cooking losses from the results of a scalding test and the amount of jelly and fat deposits for both canned and uncanned sausages.

Only when the sausage mixture was relatively heat-labile (that is, when the muscle protein was relatively inactive) was soya protein, added dry or as an emulsion, definitely superior to hydrolyzed milk protein. The authors suggest that

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COMMERCIAL FISHERIES ABSTRACTS VOL 24 NO. 4 PAGE 23

6.54 ENZYMATIC SOLUBILIZATION OF FISH PROTEIN CONCENTRATE:  
BATCH STUDIES APPLICABLE TO CONTINUOUS ENZYME  
RECYCLING PROCESSES

Cheftel, Claude, Michael Ahern, Daniel I. C. Wang, and Steven R. Tannenbaum (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Mass. 02139)  
Journal of Agricultural and Food Chemistry 19, No. 1, 155-161 (January-February 1971)

Fish protein concentrate (FPC) prepared by solvent extraction of fish is not readily soluble or dispersible in foods. Because the protein of FPC is of high biological value, it should be in forms useful in a variety of foods such as soups, weaning foods, and protein beverages. This paper reports on studies of batch experiments to obtain data on a continuous solubilization process of FPC by proteolytic enzymes (of plants, animals, and microorganisms). The batch kinetic data were gathered by the researchers with the intention of converting this system into a continuous reactor capable of enzyme reuse through application of an ultrafiltration membrane. Methods were adapted for the assay of the proteolytic activity in the FPC hydrolysates.

The FPC used had been prepared by isopropanol extraction of fresh whole red hake (*Urophycis chuss*). The following commercial enzyme preparations were used: Pronase; pepsin; papain; bromelain; ficin; Rhozyme P11; Rhozyme 41; enzyme No. 56; and Monzyme PA-11.

Pepsin and Pronase were particularly effective for solubilization of FPC. Because Pronase appeared to be particularly promising for a continuous proteolytic process with reutilization of enzyme, the researchers determined the effects of pH, temperature, substrate, and enzyme concentrations on the rate and extent of FPC

COMMERCIAL FISHERIES ABSTRACTS VOL 24 NO. 4 PAGE 23







Carver, J. H., and F. J. King (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts)  
Food Engineering 43, No. 1, 75-76 (January 1971)

Fish-deboning machines have been used commercially for several decades. This article describes one of them and suggests possible uses of the recovered, comminuted product.

The machine consists of an endless rubber or plastic belt pressing tightly against the outside of a rotating, open-ended, perforated drum. Belt and drum move in the same direction but, since they move at different speeds, a shear force is brought to bear on the fish squeezed against the drum. The soft, plastic fish flesh is forced through the perforations into the drum (whence it falls into a collector bin) while the skin and bone remain on the outside of the drum, to be scraped off into a waste chute. The yield of edible flesh ranges from 40 to 86%, depending on the type of fish being deboned. Use of the machine to recover fish flesh from fillet wastes, say the authors, could add some \$17,000,000 to U.S. processors' earnings.

Taste panels have found three of the products made from the recovered flesh acceptable: fish cakes (50% whiting, 49% potato, 1% salt, pepper, and dehydrated onion), canned fish (salad oil, salt, and fish retorted), and frankfurters (76% cod or haddock, 10% salad oil, 7.5% flour, 2.5% seasoning, 2% salt, and 2% corn syrup solids). The authors suggest other possible uses of recovered fish flesh.  
LB

Drake, B., and B. Johansson  
Academic Press, 111 Fifth Avenue, New York, N.Y. 10003 (1969), Vols. 1 and 2, 418 pp., price \$18 each volume.  
Food Technology 25, No. 1, 87 (January 1971)

These two volumes contain an annotated bibliography covering 725 papers in the physiology, 465 in the psychology, 670 in the methodology, and 364 in the application of sensory evaluation.

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were much lower than those of Gulf shrimp.

Bacterial counts of shrimp delivered to processing plants varied greatly from 870-1,300,000/g (aerobic plate counts at 28°C). The flora was predominantly *Pseudomonas*, *Moraxella* and *Micrococcus*. The flora of shrimp raised in artificial ponds

MICROBIAL FLORA OF GULF OF MEXICO AND POND SHRIMP

7.85  
(1.85)

Vanderzant, C., E. Meoz, and R. Nickelson  
J. Milk Food Technol. 33, No. 8, 346-350 (1970)  
BETTER 23, No. 12, Abstract No. 2658, 637 (December 1970)

Murphy, Elizabeth W., Louise Page, and Bernice K. Watt (Consumer and Food Economics Research Division, Agricultural Research Service, U.S. Department of Agriculture, Hyattsville, Maryland)  
Journal of the American Dietetic Association 58, No. 2, 115-122 (February 1971)

This article contains data on the content of nine trace elements in Type A school lunches served to sixth grade children. A Type A lunch for a 10- to 12-year-old child (under the pattern in effect at the time of the study) must contain at least 1/2 pt. fluid whole milk served as a beverage; 2 oz. of meat (edible portion as served); 3/4-cup serving of two or more vegetables or fruits, or both; one slice of whole grain or enriched bread; and 2 tsp. of butter or fortified margarine. Samples of Type A school lunches were collected from 300 schools for the analyses.

On the average the lunches contained 0.019 mg. chromium, 0.34 mg. copper, 0.45 mg. manganese, 3.91 mg. zinc, 8.26 mg. aluminum, 0.17 mg. barium, 0.50 mg. boron, 0.013 mg. cadmium, and 0.33 mg. stable strontium. The amounts of copper and chromium are probably marginal or low; manganese may be adequate; and zinc is probably adequate. The amount of aluminum in the lunches varied widely. Cadmium and chromium contents were near the lower limits of sensitivity for the analytical method used. The contents of all trace elements were significantly related to food energy of the Type A lunches. [4 tables, 25 references]

FTP

Watanabe, Takeshi (Laboratory of Fisheries Biochemistry, Tokyo University of Fisheries, Minato-ku, Tokyo, Japan), Fumio Takashima (Department of Fisheries, Faculty of Agriculture, The University of Tokyo, Bunkyo-ku, Tokyo), Chinkichi Ogino, and Takashi Hibiya  
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 9, 972-976 (September 1970)

In an earlier paper, the authors reported that carp fed a diet deficient in  $\alpha$ -tocopherol showed symptoms of muscular dystrophy, or "Seko disease," a malady induced by consumption of oxidized oil. In the present paper, they report the results of experiments in which carp were fed for 90 days on four diets supplemented with varying amounts of DL- $\alpha$ -tocopherol and two diets to which no tocopherol was added. In three of the enriched diets, 10, 30, or 50 mg. of tocopherol per 100 g. dry diet was added to the methyl esters from soy-bean oil; in the other, 30 mg. tocopherol/100 g. was added to a diet containing 5% of soy-bean oil rather than the methyl esters.

Carp fed the diets containing no tocopherol began to show signs of muscular dystrophy within 50 days of the start of the test. By the end of the test, more than 90% of the fish showed symptoms of this disease. Around the 70th day, these fish began to show lordosis, frequently accompanied by acute protrusion of the eyes; swollen, fluid-filled bodies, reflecting low protein content and high TEA values; and a high rate of mortality. Fish receiving diets enriched with  $\alpha$ -tocopherol showed no signs of muscular dystrophy.

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1970) (Halifax Laboratory, Halifax, Nova Scotia)

many control laboratories.  
use in such laboratories.

calculated using a standard IPA curve.

Fish., Seattle, Washington)

(3.15)

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Figure 229, No. 5279, 65-66 (January 1, 1971)

n, University of Bristol, Bristol,

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J. Cons. 32, No. 2, 256-269 (1968)

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(September 1970)

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[2 figures, 3 references]

Journal of Nutrition 101, No. 1, 133-140 (January 1971)

the DVI applied to field crops by evaporation. [8 references]

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(September 1970)

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[2 figures, 3 references]

Journal of Nutrition 101, No. 1, 133-140 (January 1971)

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(September 1970)

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[2 figures, 3 references]



9.14  
(1.85)  
NUTRITIONAL REQUIREMENTS OF PRAWN. I. FEEDING ON ARTIFICIAL DIET  
Kanazawa, Akio, Makoto Shimaya, Mitsuyasu Kawasaki, and Ken-ichi Kashiwada (Laboratory of Fisheries Chemistry, Faculty of Fisheries, Kagoshima University, Kagoshima, Japan)  
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 9, 949-954 (September 1970)

Although prawns can be cultured successfully by being fed such natural diets as *Tapes philippinarum* or *Mytilus crassitesta*, maintaining the necessary supply of fresh mollusks can be difficult. Therefore the authors attempted to formulate an artificial diet consisting of materials chemically defined to meet the nutritional requirements of the prawn. Using the diets previously determined as nutritionally adequate for silkworm, chinook salmon, and brine shrimp, they tested the effects of four formula diets on *Penaeus japonicus*. The composition of the four is shown on the back of the card. The results of feeding each is shown below.

[1 figure, 6 tables, 35 references]

Diet	Period fed days	Average body weight at stage of test			Growth rate percent
		Start grams	End grams		
1	30	0.54	0.71		20
2	30	0.98	1.22		25
3	17	1.02	1.32		63
4	30	1.57	2.22		72

Note: Growth rate is expressed as a percentage of the growth rate of clam-fed controls.

9.15  
(2.4)(1.87)  
DISINFECTION PROCEDURES FOR THE CONTROL OF BLOOD DISEASE (GAFFKEMIA) IN LOBSTER STORAGE FACILITIES  
Cornick, John W., and James E. Stewart (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)  
Fisheries Research Board of Canada, New Series Circular No. 42, 3 pp. (December 16, 1970)

After gaffkemia (a blood disease fatal to lobsters) has gained a foothold in lobster tanks or tidal pounds, the causative bacterium can be eradicated only by shutdown and thorough disinfection of the pound. Such a resort leads to loss of time and money. The most effective control, then, is regular cleaning and disinfecting throughout the year. This report contains recommendations for eliminating *Gaffkya homari*, the blood-disease bacterium, from tanks and tidal pounds.

Disinfecting lobster tanks:

- (1) Fill tanks and piping system with sea water; when full, stop the water flow.
- (2) Add enough calcium hypochlorite to the tank and the pipes to make a 1% chlorine concentration.
- (3) Scrub the surfaces of the tank thoroughly with a stiff brush.
- (4) After the disinfectant has worked for about 3 hours, drain the tank and the pipes and flush thoroughly with water for from 3 to 6 hours.
- (5) Since chlorine is extremely toxic to lobsters, use a chlorine-testing kit to determine residual chlorine before restocking the tank.
- (6) Stock disinfected tanks with newly delivered lobsters only; do not move lobsters from untreated tanks to clean tanks.
- (7) Use only equipment (such as dip nets and baskets) that has been disinfected.

9.19  
SELECTIVE PREDATION BY NEWTS ON FROG TADPOLES TREATED WITH DDT  
Cooke, A. S. (Monks Wood Experimental Station, Abbots Ripton, Huntingdon, Hunts., England)  
Nature 229, No. 5282, 275-276 (January 22, 1971)

The behavior of frog tadpoles changes distinctly following the tadpoles' exposure to DDT--at first they swim frantically about lashing their tails and twisting their bodies; next they swim slowly and persistently about in a twisting manner; and finally they become moribund and die. During 100 trials with DDT-treated and control tadpoles, newts caught 10 times as many of the treated tadpoles, probably because of their hyperactivity and therefore conspicuousness. The author theorizes that although pesticide-induced hyperactivity may be a hazard to the individual animal, it could be beneficial to the unexposed population by redirecting predatory activity. However, this type of selective predation could also be harmful if the predator is susceptible to toxin and the prey is relatively resistant. [3 tables, 9 references]

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Hawkes, H. A. (Dep. Biol. Sci., Univ. Aston, Birmingham, England)  
Chemical Abstracts 73, No. 18, 91016f (November 2, 1970)

(7.43)

ECOLOGICAL CHANGES OF APPLIED SIGNIFICANCE INDUCED BY THE DISCHARGE OF HEATED WATERS

9.6  
(0.6)(9.12)  
BETWEEN WORLD TIDES

Glover, R. S. (reviewer)

Nature 229, No. 5284, 431-432 (February 5, 1971)

This review covers two books, both edited collections of papers dealing with marine ecology.

1. Marine Food Chains, edited by J. H. Steele. (Oliver and Boyd: Edinburgh, Scotland, 1970) viii + 552 pp. 100s.

This volume consists of 29 papers (delivered at a symposium in Aarhus, Denmark, in July 1968) covering a specific aspect of marine ecology, the food chain. The papers are grouped into six categories, each introduced by an authority on that particular aspect of the subject: "Recycling of Organic Matter," "Pelagic Food Chains," "Feeding Mechanisms," "Food Abundance and Availability in Relation to Production," and "Theoretical Problems." Many of the papers deal with the terminal yield of the food chain and the significance of yield in fisheries management. It is pointed out that further progress in understanding the ecological efficiency of the food chain will come from increased studies, in the field, of natural, functional populations, for regions and taxonomic groups vary so fundamentally that generalized models will probably be inapplicable to a broad treatment of the problem.

These papers, as symposia should, leave a clear impression of what is not known and of what should be done next. The reviewer considers it a most useful volume for experienced research workers, particularly for those who are planning future research programs.

(over)



As an example of the effectiveness of this procedure, the authors cite their experience in a disease situation. Surveying a tank that had shown heavy losses of lobster, they found *G. homari* in all 13 water samples taken throughout the system, including in the water flowing into the tank. After disinfection, they could detect no organism in any of the water or slime samples taken from the same locations as before. They recommend routine scrubbing and flushing each time the tank is emptied of lobsters. When water temperatures reach 50° F. and above, the disinfection procedure should be followed.

#### Disinfecting tidal pounds:

- (1) Sprinkle powdered calcium hypochlorite (70%) over the floor of the pound at a concentration of 0.5 lb./100 sq. ft.
  - (2) Fill the pound with water and allow to stand for 3 days.
  - (3) Before restocking, thoroughly flush for three tidal exchanges to eliminate residual chlorine.
- In a study to test the effectiveness of this procedure, the authors took five mud samples from each of four compartments of a commercial pound. Three of the four compartments, and 50% of the samples, contained *G. homari* organisms. After disinfection, none of the samples taken from the same places as before showed signs of the bacterium. The authors recommend that tidal pounds be disinfected before they are restocked, or at least once a year.

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#### 9.14 FOOD VEHICLE FOR ORAL ADMINISTRATION OF PHARMACEUTICALS TO FISH

Tupa, Frantisek, Josef Kral, and Bohumil Sevcik (Spofa, United Pharmaceutical Works)

German Offen. [Patent Application] 2,009,159 (September 10, 1970)

Chemical Abstracts 74, No. 2,6401f (January 11, 1971)

9.15 (58.1) 9.1

Constituent	Percentage of each constituent in			
	Diet 1	Diet 2	Diet 3	Diet 4
Glucose	24.3	7.8	--	5.6
Sucrose	--	10.0	5.1	10.0
Starch	18.0	18.0	4.0	4.0
Chitin	--	--	4.0	4.0
Glucosamine	--	--	1.5	1.5
Cellulose powder	4.0	4.0	4.0	4.0
Purified soy-bean protein	40.0	40.0	60.0	50.0
Methionine	1.0	1.0	1.0	1.0
Tryptophan	0.2	0.2	0.2	0.2
Amino acid mixture	--	5.0	--	--
Glutamic acid	--	--	0.2	0.2
Glycine	--	--	0.1	0.1
RNA	--	--	0.5	--
Citric acid	--	--	0.3	0.3
Succinic acid	--	0.5	0.3	0.3
Fatty acid mixture	--	0.5	0.3	0.3
Refined soy-bean oil	--	2.4	--	--
Salt mixture	--	--	8.0	8.0
Vitamin mixture	7.7	7.7	7.7	7.7
Cholesterol	2.6	2.6	2.6	2.6
Morin (3,5,7,2'-4'-pentahydroxyflavone)	0.5	0.5	0.5	0.5
* Agar	0.5	0.3	--	--
* Distilled water	70.0	70.0	4.0	4.0
* Added to dietary mixtures before refrigerated storage.	--	--	100.0	100.0

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2. Marine Ecology. A Comprehensive, Integrated Treatise on Life in Oceans and Coastal Waters, edited by Otto Kinne. (Wiley Interscience: London and New York, November 1970) Volume 1, Part 1, ix + 681 pp. 250s.

Volume 1 (titled "Environmental Factors") is the first of five projected volumes intended to review and synthesize existing knowledge of marine life. Succeeding volumes will deal with "Physiological Mechanisms," "Cultivation," "Dynamics," and "Ocean Management." Some of these volumes, also, will have more than one part.

Part 1 of Volume 1 has three chapters: an introductory one on the oceans and coastal waters as life-supporting environments, one on light, and one on temperature. The two latter are each divided according to a standard outline: an introduction, followed by reviews of the responses to light, or temperature, of bacteria, fungi and blue-green algae, plants, invertebrates, and fish, in that order. Within each of these subdivisions, the responses are further subdivided into functional responses (under the following subheadings: tolerance, metabolism, reproduction, and distribution) and structural responses (under size, external structures, and internal structures). Each chapter ends with a comprehensive bibliography; more than 1,800 scientific papers are cited in this first part.

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Kacz, Morris, D. E. Sjolseth, Donald R. Anderson, and L. R. Tyner

Chemical Abstracts 73, No. 14, 69575r (October 5, 1970)

#### REVIEW OF THE 1969 LITERATURE ON WASTE WATER AND WATER POLLUTION CONTROL. WATER POLLUTION. EFFECTS OF POLLUTION ON FISH LIFE

9.19 TEST FOR CONTAMINATION  
(9.6)(7.49)

Marley, W. G. (reviewer)  
Environmental Surveillance in the Vicinity of Nuclear Facilities  
William C. Reinig (editor)  
Published by Thomas, Springfield, Illinois; July 1970; xvi + 465 pp. \$29  
Nature 229, No. 5284, 434 (February 5, 1971)

This book contains 46 papers, contributed by authors from 16 countries, that were presented at a symposium of the Health Physics Society in January 1968. It is divided into five parts. The first contains three papers concerned with the objectives of environmental surveillance; much of this part is based on the recommendations of the International Commission on Radiological Protection (Publication Seven, "Principles of Environmental Monitoring"). A rather substantial part is devoted to the design and use of methods of environmental surveillance under normal and emergency conditions. Another part consists of seven papers dealing with the consequences to populations of doses of ionizing radiation, determined from actual experience in the operation of nuclear facilities. One of the papers in this part reviews the recommendations of four international agencies--the International Commission on Radiological Protection (providing fundamental principles and information on the significance of radiation exposure), the International Atomic Energy Agency, the Food and Agriculture Organization of the United Nations, and the World Health Organization (the last three providing good references for radiochemical methods and analyses and for the use of instruments). The fifth part is concerned with research in support of environmental surveillance; data are presented on the behavior of radioactivity in the environment (e.g., of strontium in streams and of tritium in air and soil) and its passage through food chains to man.

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--			Katz, Morris	28	9.19	Ogawa, M.	14	2.3	Tyner, L. R.	28	9.19
Couch, J. R.	23	6.195	Kawahara, Fred K.	19	7.9	Ogino, Chinkichi	25	9.14	Uchiyama, Hitoshi	4	0.33
Curley, Jerome K.	7	0.8	Kawakami, Ken	17	7.9	Okitani, Akihiro	1	0.32	Uzmann, Joseph R.	29	9.12
			--			Olsson, Mats	29	9.19			
Dalcq, P.	16	3.2342	Kawasaki, Mitsuyasu	27	9.14	Page, Louise	25	8.42	Vanderzant, C.	25	7.85
Damberts, N.	26	7.89	Khiamova, R. I.	17	3.4	Pathmanathan, K.	21	4.6	Van Staveren, W. A.	8	0.7
Dazai, M.	14	2.3	King, F. J.	25	6.54	Pell, Claiborne	29	9.3	Venno, Paul M. W.	13	2.1128
De Boer, E. J.	13	2.1121	Kinne, Otto (ed.)	28	9.6	Pelroy, G.	26	7.80	Vergara G., Nizar E.	9	1.013
De Figueiredo, Mario P.	12	2.3	Kirschner, E.	22	6.138	Petrovic, Ivan	16	3.12	Volovinskaya, V. P.	17	3.4
De Freitas, A. S. W.	5	0.39	Koizumi, Chiaki	3	0.322	Pezaeki, W.	24	6.54	Walker, M. Greer	13	2.12
Denton, Eric	29	9.12	Kolonics, Z.	8	0.8	Porter, M. C.	2	0.116	Walker, P.	13	2.01
Drake, B.	25	7.80	Kon, Hideo	2	0.32	Priddy, Arthur H.	29	9.19	Wang, Daniel I. C.	23	6.54
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Dyer, William J.	16	3.12	Koritata, Sambasivarao	21	6.138	Purr, A.	21	6.138	Watanabe, Takeshi	25	9.14
			Kotter, L.	23	6.54	Redfern, R.	1	0.12	Westmark, Torbjorn	25	8.42
Ehira, Shigeo	4	0.33	Kral, Josef	28	9.14	Regier, L. W.	26	7.89	Westrom, R. T. (pat.)	29	9.19
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Evans, G. H.	5	0.6	Kreienbring, F.	24	6.195	Reinig, William C. (ed.)	28	9.19	White, Richard H.	19	3.4
			Kremling, K.	2	0.114	Reuter, H.	24	6.54	Wuensche, J. W.	24	6.195
Farrin, Afton	13	2.1128	Krischer, Kenneth N.	4	0.38	Richards, James F.	15	3.15	Yakovleva, G. Ya.	17	3.4
Fennema, Owen	22	5.5	Krylova, N. N.	17	3.4	Rinaldo, Ronald G.	13	2.1128	Yang, Ryung	1	0.32
Fenters, W.	15	3.231	Kumeno, F.	23	6.52	Roepeke, K.	24	6.195	Yashouv, A.	3	0.321
Ferrier, B.	8	0.7	LeTellier, Paul R.	20	4.2	Rylander, Paul N.	21	6.138	Yeh, Cheng P.	19	4.5
Findlay, G. M.	5	0.39	Libenson, C. M. (pat.)	24	6.54	Saito, Kaoru	3	0.320	Youhotsky-Gore, I.	21	4.6
Fontaine, Bernard	12	1.85	Liebing, H. A.	22	6.133	Sakr, Ahmad H.	8	0.7	Ziemba, John V.	15	3.231
Fujimaki, Masao	16	3.15	Linke, H.	17	3.335	Sandri, Mauro	22	6.190			
--			Lloyd-Jones, C. P.	26	7.9	Schiller, Klaere	22	6.190			
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Gorbatov, A. W.	6	0.6	Lowrey, E. R.	17	3.4						
Gorbatov, W. M.	6	0.6	Lowrey, E. R.	17	3.4						



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